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Collaboration in

The Print Works

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IN THE following article the writer will try to point out a few ways in which collaboration between heads of departments in a print-works will lighten the task of all and result in better and more efficient workmanship all around.

In the very forefront comes the matter of designing of patterns. This is a most important matter and one which has its effect throughout every process in the final production of the goods. Designing in its relation to the subsequent processes is a subject which is hardly touched upon in the literature of printing and for this reason is all the more interesting.

In very large works where the heads of departments work at a good distance apart from one another it usually happens that little or no opportunity is given for discussion of mutual problems and it is probable in many instances that the men concerned are not even acquainted with each other.

The relation of the design to the method of printing is probably the most important matter of all and unless the designer of patterns has at least a fundamental knowledge of the printing processes involved, much needless trouble and preventable damage may be caused in the subsequent working out of his ideas.

To begin with roller printing, it will be necessary first of all for a designer to ensure that as far as possible all the patterns that are to be engraved on one set of rollers are evenly balanced. Here it will be necessary to have the advice of both engraver and printer if possible. The former will help in the selection of patterns which will lend themselves to a particular style of engraving or will perhaps suggest such minor alterations as will make existing patterns suitable. While the printer will ensure that no pattern is included that would make it impossible at the same time to produce good work on the others, which may be heavier or lighter, finer or coarser as the case may be.

No engraver should put on the same roller a heavy blotch and a group of fine lines or stipple work. He should always exercise his knowledge of printing in copying designs or at least ask a printer's advice when in any doubt.

As an actual case the following may be cited. On a pattern consisting of large petalled flowers there was a binder round the flowers and also a ground work, both consisting of lines and groups of small dark dots. The dots represented by the designer were copied by the engraver who made them perhaps a shade larger than they appeared in the design. The result was that when the pattern came to be printed the dots showed up much larger than the designer intended, partly due to the engraving and largely to the spreading of the color in the process of printing. In the end the roller had to be sent back to the engraver for rubbing down so that the spots appeared much smaller, thus giving the desired effect. The larger dots entirely spoiled the appearance of the design making it look clumsy and awkward whereas the true effect was a Parisian delicacy only to be obtained by the use of the finer dots.

To come to the actual printing, the lot of the printer can be considerably eased and better work produced by a little judicious forethought on the designer's part. For instance, he may instead of having only one dark outline in the pattern introduce two. This will seem at first sight to be a waste of time and copper but when the final results are compared such is not the case.

The fact that there are two outlines makes it a much easier proposition for the printer to keep them in perfect register. Where there is only one it is a difficult matter to keep the register all over the pattern. Whereas with two the problem is paradoxically simplified by the multiplication of possible adjustments open to the printer. Where in the first instance he could only make two moves to keep the pattern in register, i.e., shift his outline roller or its corresponding object roller, now he has four possible adjustments in order to keep in register the same number of outlines and objects.

In yet another instance the designer can make things

easier for the printer by altering the construction of his design from the horizontal to the vertical form. In the case in mind there were horizontal bars ¼ inch wide by 1 inch long, connecting other objects to form a chain. A repeat of this chain in rows one inch or so apart constituted the pattern which was sent out for engraving in horizontal lines across the roller. By a chance the foreman printer happened to see the pattern before the engraver and had it altered to vertical lines running round the roller, without making any appreciable difference to the design which as a matter of fact was improved rather than otherwise for the purpose in view. Had the design been engraved as originally intended great difficulty would have been experienced in printing it, if it had not been found quite impossible owing to the fact that the doctor blade would have been dipping continually into the engraving and removing color therefrom at every revolution of the printing roller. This of course would give the effect of miscolor and utterly spoil the pattern.

Another important matter on which designers would do well to consult with colorists more frequently is in the opening up of a design which does not depend for its effect on closely intermingled detail. In such designs which consist largely of multi-colored objects thrown haphazardly together, as it were, in groups or sometimes to form an all-over pattern, it is quite an easy matter for the designer so to arrange his material that no two objects need touch or fall upon each other at any part. This will allow the colorist much more scope in his choice of colors, especially in fast color work. He can, for instance, use vats along with rapidogens or rapid fasts, vats and indigosols if desired, aniline black and vats and so on. Had the objects been touching here and there or partly falling on throughout the pattern it would be impossible to use the combinations mentioned. A vat and a rapidogen touching or falling on each other means destruction to both as far as shade is concerned and the same is true of aniline black and vats.

The advantages of such an arrangement are manifold. First from the economic point of view it is much cheaper to print an azoic red than a vat red of similar concentration, the vat in some instances costing as much as three times the price of the azoic. In the case of aniline black it is probably about five times cheaper than most vat blacks.

Apart from the advantages in price, aniline black is much easier to work in the printing machine (at least in the writer's experience) and will give much finer lines and far clearer outlines than vat blacks. Azoic reds offer similar advantages besides the additional benefit of being fairly easily removed if damage occurs during printing in the form of streaks, seams, etc. This advantage applies also to aniline black and for this reason alone such colors are to be preferred to vats when possible as damage done in printing with vat colors is irreparable.

As regards fastness aniline black is quite safe for guaranteed washing styles which do not have to be treated with bleaching powder solutions, while many of the azoics are just as fast as vats, being indeed in some instances of superior fastness to similar shades in the vat range.

Regarding patterns which contain groups of fine lines much advantage will accrue to the colorist in many instances if the position of these be slightly altered. Suppose a pattern is interspersed with small bunches of fine lines it will not matter to the design greatly in many cases whether the lines be horizontal or vertical but it will matter greatly both to colorist and machine printer

As is well known running lines are much easier to print than cross lines it being obvious that a color will run better down a shallow incision in a copper roller than across it and will stay in it more easily. To make a thickening suitable for cross lines is a difficult job and even when the best has been done from the colorist's point of view the print has still to contend with the effect of the doctor blade coming right across the line instead of along it, thus as has been previously pointed out running the risk of scraping the color partly out of the engraving, giving rise to broken lines and a bad impression generally.

With regard to discharge styles much difficulty might be avoided by keeping outlines clear of objects so as to allow the use of colors which do not stand up to hydrosulfite. For instance if a dark outline were required it would be possible to use certain chrome mordant colors which are fixed by a short steaming for this purpose. On the other hand if the outline were close to the object (and many of them are) such colors would be affected to their detriment by the hydrosulfite discharge. It is not always possible to do this without spoiling the effect of the patterns but it is possible in many cases to make the outline of such weight that even if part of it is destroyed by the reducing agent, enough is left to give the desired effect.

A case in point may be cited. An overall pattern consisting of a red and black effect made up of spots of red and pink bound with a black outline was printed with azoic red and pink and an aniline black outline. Both are oxidation products but the alkalinity of the red and pink acted as a resist to the black. In the case of the red only about half the thickness of the binder showed in the print while the pink showed it nearly full thickness, the extra alkalinity of the dark color of course acting as a stronger resist to the black. In both cases the outline had been made sufficiently bold to give a pronounced effect of red and pink spots bound with black.

Another type of design which would be as well left alone is that which requires for its effect a white spot on a dyed ground, with another colored object in the center of the white spot. In the first place the mechanical difficulty of getting a perfectly sharp clear mark on a place already damp with color or where another color is about to fall is considerable. In the second place where a black is wanted in such a case it is not an easy matter to get a good black to stand up to the strong discharge necessary to obtain a pure white on a dark ground.

Aniline black is out of the question; vat black is equally so in cheap discharge styles and also by reason of difficulty

in reconciling the ageing times and conditions of both types of color, basic-hydrosulfite-discharge and vat. The only alternative then is to use logwood black. But this is in a measure affected by hydrosulfite, only giving a brownish black under the influence of reducing agents. In order to combat this it is necessary to use some resistant to hydrosulfite either with the black itself or by impregnation of the material. Chlorate of soda at 1 oz. per gallon, or other products on the market, will all act well in this capacity and give a good full black in the space showing white discharge.

Regarding the coloring of the designs to be sent out to customers for approval, this should never be done haphazardly. A little advice on the part of the colorist will often make all the difference in subsequent work. By using colors from a complete range of shades supplied by the colorist, the customer's needs can often be fully met while at the same time colors are often accepted with which the colorist knows he can deal. Thus everyone is satisfied and there are no off-shades due to the difficulty of matching out-of-the-way colors which have been included merely because cuttings of them lay ready to a customer's hand.

Where block-prints are concerned many difficulties can be overcome by a little care in designing, especially in handkerchief designs where one often sees the most ludicrous combination of motif in one pattern. On the very day of writing this paragraph the writer had cause to comment unfavorably on such a pattern, the design of which had evidently been drawn up by someone who had taken little or no trouble to find out anything about the manner in which his design was to be applied. The outer part of the pattern consisted of a heavy floral scroll carrying a good deal of color while the center of the handkerchief was occupied by a much finer maze of wavy lines with very small spaces between. To get the outer parts well furnished with color it was necessary to cover the wood with cotton cloth so that the block would carry more of the printing paste. At the same time it was found imposisble to cover the center in like fashion, so that while the outside parts were well printed and penetrated the inside portion was poorly printed as well as being flushed in those parts where the lines almost met. The fairly thin color suited to the floral part of the pattern was quite unsuitable for the inner portions, hence the trouble which could have been avoided by making the center part of the pattern more in keeping with the outer portion.

Another great fault in block designs is the making of patterns which necessitate the use of wood and copper on one block; to have a wooden bar, say half an inch or more wide, flanked by a series of lines that can only be printed with copper is asking for trouble. The thickening suited to the bar is bound to be fairly thin and as it would be quite impossible to obtain a good sharp copper line with the same medium, the only thing to do is to use such a thickening as will make a middling job of both and risk the consequences. Patterns of this type ought always to be printed two-color fashion with two blocks, a bar and a bunch of lines printed separately. The extra time involved will be more than compensated by the cutting of possible losses and the good opinion of the customer.

In the matter of spot designs such as a small white spot on a navy ground the designer should always keep in mind the fact that such spots always print larger than they appear on the design because of the spreading of the color and this particularly so where vat colors are concerned, the latter class of color being apt to fill in a little during steaming even under the most favorable conditions. Where the spots are large the risk is not so great but where very small, closely grouped spots are concerned they should always be kept a little smaller in the design and in the block when cut than they are to appear in the finished article.

A matter which affects all sorts of designs, block machine and screen, is the fall-on type of pattern where part of the design falls on top of another part which is not cut away to make room for it. Such an arrangement makes it impossible to use certain combinations of color. The falling-on portions must always be the light color in order to allow the dark colors to show up properly. For this purpose the dark color also must always be printed first. For instance, a navy printed on top of a red will not show up as well as if the navy object were printed first and the red allowed to fall on top of it. The reason for this is that the fabric is already furnished with color and cannot take in any more so that the second color is as it were thrown off in favor of the first printed.

From designing we pass on to the actual mixing of the colors for printing and here I suppose we come to where friction between departments is most likely to result in bad work and general dissatisfaction. It often happens as a result of faulty designing or engraving that even when color mixers and printers have given of their best a job is still unsatisfactory.

To quote another instance. A single color pattern consisting of a series of running stripes gave trouble in printing, being bare and ill-furnished. As the roller was perfectly new, no one thought of examining it. The printer tried all the dodges he knew, such as altering the pressure, putting on new lapping, using different doctor blades and brush furnishers, all in vain. The color mixers made up all sorts of thickenings, British gums, starch and tragacanth, thick and thin color, still without noticeable improvement. At last the printer in despair examined the roller closely and found that although the roller was sent in as perfect the engravers had polished the engraving down till it was worn bare, thus giving rise to the ill-furnished print. What had actually happened was that the roller had been damaged after engraving and in order to shield himself the culprit had polished away the damage and in so doing had spoiled the original engraving in the manner described.

In the matter of making colors to suit different patterns much patience must be exercised by the color mixers who frequently have to deal with colors sent back for alteration because of being too thick or too thin. As a general principle it is best to keep colors rather on the thick side, as it is much easier to thin them than to thicken them. Of course, discretion must be observed even here, taking care not to send in color that would prove unworkable in the printing machine.

Patterns that require very thick color are usually composed of very fine lines, dots, stipple work, etc. While those requiring thin colors are of the blotch type being made up of masses of color. Again, the type of cloth being printed will in a large measure determine the consistency of the color required. A heavy crash linen cloth will require the use of very thin colors as a rule, while the same color and pattern on a fine cotton cloth would prove quite unprintable.

To take the matter of fine line and stipple printing, there are many ways to meet this daily problem of the printers and color mixers. In the first place it must be remembered that fine lines are usually printed in dark colors as otherwise they would not lend to the pattern the required effect. In order to print a fine line satisfactorily it is necessary to have a good viscosity and gumminess in the color, which can only be supplied by the use of British gum, dextrin or some of the other kindred thickenings. On the other hand to obtain a good yield and bloom of color it is necessary to use starch thickenings which do not possess the qualities necessary to give a fine clearcut line free from all tendency to flush or look ragged at the edges. Here then there must be a compromise usually met by using a thickening composed of one part starch and one part British gum or a similar mixture. In this case of course there is a sacrifice of color yield, such a color probably costing twice as much as one made up with a pure starch or starch and flour thickening.

There are still other ways of meeting the same problem though perhaps more time may be taken up in the preparation of the color. One such method is to make up the color (a little stronger than is required) with starch and flour thickening, then by the use of dry British gum bring it to the required gumminess for the pattern in hand. The method used is as follows:

For every gallon of color made up put into a tub 1-1½ lbs. dry British gum, and while stirring vigorously add 1 gallon or so of the color to be thickened until it has formed a thick sticky mass. This is then gradually let down with the rest of the color until all has been carefully mixed in, the whole mixing is then well strained through at least two fine straining cloths. It is most essential that all the dry gum be thoroughly incorporated with the printing paste, otherwise trouble may ensue from particles of the dry gum finding their way on to the printing rollers and thus causing white specks, etc. This method should only be used for chrome mordant and steam colors generally, but not for vat colors.

With regard to adding dry thickening agents to made-up colors some advance on these lines has recently been made by a Dutch firm who were pioneers in this line. One of their products (Product A) is a special form of thickening resembling British gum as nearly as possible in all its properties, but capable of being brought into solution for printing without boiling and merely by its addition to cold water. Another product (Product B) is similar to starch tragacanth and has the same solubility properties as the other. One of the great advantages of both these thickenings is that they can be added directly to the color in aqueous solution thus obviating all boiling treatments either preceding, during or subsequent to making up the color; while again in the case of fine line patterns, etc., the made-up color can be thickened to the required degree without any of the risks of adding dry British gum. These products are dissolved completely in a short time whereas the dry British gum is at best only held in suspension in a very fine state of division. That this is a great advantage cannot be denied as can be shown by the following recipes, taking also in account the fact that 1 lb. of Product A will thicken the same quantity of water as will require the use of 2 lbs. British gum proper.

For 5 gallons Chrome Mordant Color (old method):

15-20 lbs. British gum boiled for 1 hour in
3½ gallons water, add
20 oz. dyestuff dissolved in
½ gallon hot water, and when well mixed
3 pints acetate of chrome 32 deg. Twaddle.
Make up to 5 gallons and strain.

New Method (using Product A):

Dissolve 20 oz. dyestuff in ½ gallon of hot water, or more if necessary, and make up to
4 gallons with cold water, add
7½-10 lbs. Product A, allow to dissolve and add
3 pints acetate of chrome 32 deg. Twaddle.
Make up to 5 gallons and strain.

One of the advantages of the latter method is that when large quantities of dyestuffs are being used as much hot water as is required for their proper solution can be used without any danger of making the color too thin.

As both color mixers and printers have reason to deplore the results of color not being properly in solution the innovation is sure of a welcome. With basic colors which are difficult to dissolve this is a recurrent problem and such a method should make it easier for all concerned to produce good work.

The making sure that colors are well dissolved is one way in which color mixers can help machine printers. If the color is not in a soluble state to begin with, it will either cause speckiness in printing or in some cases separation will occur and cause streaks, scums, etc. A case

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(Continued on page 777)

Ageing Vat Prints*

By **H. B. BRIGGS, M.Sc., A.I.C.**

Imperial Chemical Industries Limited

THE ageing process is one which requires constant care and supervision and one which is responsible for a big proportion of the jobs and allowances account. Of the various styles aged vat prints are probably the most erratic and it is these styles that are discussed below.

Ageing machines consist of three types—

(1) The normal type usually referred to as the Mather and Platt, in which the cloth moves over rollers.
(2) The festoon ager, in which the cloth hangs on festoons over rods which move forward.
(3) The Indanthrene ager.

In the development of vat prints essentially two operations are concerned, although there are several sub-processes—(*a*) the reduction of the dyestuff to the alkali leuco-compound, and (*b*) the transfer of that body from the paste into the fiber; (*a*) must precede (*b*), but there can be no definite line of demarcation, for immediately the reduction of some of the dyestuff particles has occurred their fixation may commence simultaneously with the reduction of the other particles.

For process (*a*) the optimum condition for the reduction would be when the temperature is greater than 212° F. if it were necessary to consider only the interaction between the dyestuffs and the reducing agent (formosul or its equivalents). Moisture is, however, necessary even for this portion of the development, and in cases where insufficient is present there is the probability that the dyestuff particles would become coated with a layer of leuco-compound which would prevent further action. This is of the greatest importance when dealing with those dyestuffs which are crystalline in character or whose leuco-compounds are of an especially insoluble nature.

For (*b*) it is generally agreed that a temperature as near as possible to the boiling point of water under the working conditions is desirable. In agers working at atmospheric pressures this will be slightly above 212° F., but in types such as the Indanthrene Ager a higher temperature is permissible.

It is thus seen that two different conditions are desirable for the work in hand, and, as both processes are going on simultaneously, one must be suffering at the expense of the other.

Dissipation of the heat generated by the use of copious supplies of steam suffers from the drawback that the increased temperature of this steam affects the whole of the interior of the machine, and were it possible to remove the heat in the regions in which it is formed more regular results would be obtained. Cooling of the rollers internally would achieve to a large extent this object. As cooling agents neither water nor steam could be used, for water drops would result from steam as the rollers would collect water when the machine was stationary, and it could not be removed sufficiently rapidly by any system of buckets. Air heated to a temperature of say 216° F. would be free from these faults and by using steam at a pressure of 3—5 lb. as heating agent a regular temperature would be obtained. The heat so expended could be recovered and with the additional heat removed from the cloth this could be used for heating water or other purposes. By this means the superheating of the steam could be kept more regular and could be confined to those portions of the ager in which a slight superheat is definitely advantageous. Were it possible to guarantee that no cloth would ever break out during the passage through the machine this system could be extended still further and vertical chests could be placed between the folds of cloth. As however, these misfortunes are always likely to occur this elaboration of this system is not likely to be of great value.

Removal of superheat by this means would render less necessary the deliberate "spoiling" of ageing conditions, a practice at present necessary when any but the lightest of patterns are printed. Steam supplies to the machine could be reduced without lowering the efficiency, and the working conditions in that portion in which fixation rather than reduction of the dyestuff occurs would be much easier to control, for temperature would become stabilized around the desired figure.

The process is in effect merely an extension of the practice of leaving unlagged the walls of the machine.

The festoon ager certainly avoids the complications due to the heating of the rollers and in this respect is a

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* Abstract of paper "Some Observations on Ageing Problems," to the Textile Institute Conference at Harrogate and printed in the *Textile Manufacturer*.

big advantage. The generation of heat is, however, as great and the long folds of cloth render circulation of steam even more difficult than in the roller type of machine.

The Indanthrene ager in which the cloth is wrapped around a perforated shell through which steam is passed is of the intermittent type and is scarcely suitable for big production, which is most satisfactorily processed by the use of continuous types of machine. On the other hand it is eminently adapted for block and screen printers for whom short lengths of fabric are the rule rather than the exception.

When cloth printed with the normal vat printing paste enters the atmosphere of steam it rapidly absorbs moisture. The absorption of water regenerates the latent heat of vaporization of water to steam, which raises the temperature of the fabric. The question as to whether heat is also generated by the reduction is less certain, and while some authorities state that this is the case others assert that the liberation of heat from this source is, at the most, only small. Be this as it may, the heat generated rapidly raises the temperature of the steam and so creates a dry atmosphere which reduces the tendency of the fabric to absorb more moisture and retards or prevents fixation of the dyestuff.

As the temperature rises above 212° F. the atmosphere in an ager rapidly becomes unsaturated. In fact, at 230° F. this relative humidity is only 70.7%.

When an ager commences to run the condition would normally be favorable for the fixation of the leuco-compound on the fiber as the temperature is only about 216° F. but after running for some time conditions become less and less favorable, and, although the dyestuff may be perfectly reduced, less is fixed on the fiber, resulting shades being weak. Some colors will show improvement with increased ageing times, while others will actually give worse results when so treated.

Prints vary in character, dyestuffs vary in properties and every works evolves a set of conditions with the machinery available so that the most consistent results are obtained. Where heavy prints are the rule and overheating is prevalent, the dyestuffs favored will be those which are very easily fixed under adverse conditions, while a works printing mainly fine shirting stripes or widely spaced patterns will find that their range of available colors is much greater.

Laboratory aged patterns show that at a temperature of 216° F. a period of eight minutes usually gives the best results, whereas when the temperature is restricted to 212° F. it is necessary to age for a period of approximately 20 minutes to obtain good results. In neither of these cases does the heating effect of running bulk come into play. Many works report that they are able to age their vat prints in less periods and in some cases 3½ minutes has been cited as a suitable time. It therefore appears that the initial overheating is beneficial as regards curtailing the time of processing. On the other hand the more rapidly the process is carried through, the more pronounced will be the difference due to any variations in conditions that may occur. A slowing down of the process would make variations less frequent and render control easier. The festoon type of ager in which the time of processing is 15 to 20 minutes probably depends to a large extent upon this factor for its efficiency.

In practice rarely if ever is it possible to run one pattern for any length of time as the ager must cope with the production of many printing machines. Conditions are therefore continuously changing, but by running heavy and lightly printed patterns alternately it is possible to obtain conditions which produce results of fairly regular quality. When ageing long runs of heavily printed goods it is often necessary to run a few lumps of greys from time to time to prevent undue increase in temperature, but this is expensive. By copious supplies of steam this rise in temperature can be counteracted to some extent, provided that the internal circulation of steam is efficient.

There appear to be two opinions as to the better way of providing for the exit of the spent steam, the first asserting that mouthpiece ventilation is sufficient, while the second contends that ventilators at the rear of the machine are essential. Similarly there are several ways by which the steam is allowed to enter the machine, from the steam main via perforated pipes along the bottom and/or the top, from perforated pipes placed between the folds or by boiling water in the bottom of the machine by closed steam coils. Whichever method is adopted it can only give satisfactory results when the steam has ample circulation facilities, and herein lies what is probably the biggest problem in ageing practice. There are invariably easy passages from the bottom steam inlet pipe to the exits and the bulk of the steam will pass via that route in preference to finding its way between the folds of the cloth. The ageing of narrow cloths in wide machines can only accentuate this trouble.

Under B.P. 282,133, a system was devised by the Grangemouth Works of the I.C.I. by which the steam is circulated across the folds of the fabric. An ager planned according to the scheme of this patent possesses cone-shaped fixtures on the sides. These are joined by a wide tube in which is placed a circulating fan. By this means the steam is circulated and the formation of accumulations of superheated steam under the tops of the folds is entirely prevented.

In the Mather and Platt type of machine the first rollers are continually being fed with fresh supplies of cloth which are generating heat from the absorption of moisture. In consequence the temperature of these rollers must become much greater than that of the steam in the vicinity and it is my opinion that the temperature of these rollers rather than the temperature of the steam prevents the fullest color value being obtained.

(Continued on page 778)

PROCEEDINGS OF THE
American Association of Textile Chemists and Colorists

DECEMBER 18, 1933

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E. I Du Pont de Nemours & Co., Wilmington, Del.

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Lowell Textile Institute Junior Section
Joseph J. Pizzuto, Chairman; Raymond L. Matthews, Secretary.

North Carolina State College Junior Section
R. A. Gilliam, Chairman; D. B. Hardin, Secretary.

NINETY-FIRST COUNCIL MEETING

THE Ninety-first Council Meeting of the American Association of Textile Chemists and Colorists was held at the Engineers' Club, Boston, Mass., October 27, 1933, at 1:30 P.M.

The following were present:—

President: R. E. Rose; Vice-President: Wm. H. Cady; Treasurer: Wm. R. Moorhouse; Councilors: Hugh Christison, Carl Z. Draves, Walter M. Scott; Councilor ex-officio: L. A. Olney, Chairman, Research Committee.

W. H. Cady was appointed Secretary pro tem., in the absence of the Secretary.

The minutes of the last meeting were read and approved.

The Secretary's balance sheet was read as follows and approved:—

Secretary's Balance Sheet—October 26, 1933

Cash on hand, Sept. 8, 1933			$ 216.70
Receipts Sept. 8, to Oct. 26, Incl.:			
Analytical Methods	5 @	$ .75	3.75
Applications—	20 @	5.00	100.00
Dues (1933)—	5 @	5.00	25.00
Dues (1934)—	2 @	5.00	10.00
Dues (Arrears)—	1 @	2.50	2.50
Registration, Chicago Meeting			200.00
Reporters (Howes Publishing Co.)			3.00
Yearbooks—9 @ $3.00			27.00
Yearbooks—1 @ $2.00			2.00
Yearbooks and Postage			3.42
			$593.37
Cash on hand, Nat'l Bank of Commerce and Trust Co.			593.47
			$593.37

The Treasurer's Report was read as follows and approved:—

Treasurer's Report—October 27, 1933

GENERAL FUND

Cash on hand—August 31, 1933	$7,265.04
Receipts—August 31, 1933 to Oct. 27, 1933	217.75
	$7,482.79
Expenditures—August 31, 1933 to Oct. 27, 1933	117.54
	$7,365.25

RESEARCH FUND

Cash on hand—August 31, 1933	$1,096.84
Receipts—August 31, 1933 to Oct. 27, 1933	2,232.25
	$3,329.09
Expenditures—August 31, 1933 to Oct. 27, 1933	808.34
Balance	$2,520.75

BANK BALANCE

General Fund	$7,365.25
Research Fund	2,520.75
	$9,886.00

First National Bank—Checking Account.....$3,509.80
First National Bank—Savings Account..... 6,376.20

$9,886.00

The following were elected to membership as of thirty days after the publication of their names provided no objections to any are received by the Secretary:—

Active:

Calcott, W. S.—7 Riverside Apts., Penn's Grove, N. J. Director of Research on dyes and dye intermediates, E. I. du Pont de Nemours & Co., Inc., Deepwater Point, N. J.

Funk, Amos H.—Hillside Road, Mt. Holly, N. J. Boss dyer, Ankokas Mills, 14 King St., Mt. Holly, N. J.

Grover, Arthur W.—125 Woonsocket Hill Road, Woonsocket, R. I. Mill Chemist, Uxbridge Worsted Co., Glenark Mill.

Klotz, Milton M.—736 Highland Ave., Palmyra, N. J. Dyer, E. Tutro & Co., E. Thompson & Clearfield Sts., Philadelphia, Pa.

McGowan, Daniel, Jr.—1135 West Tioga St., Philadelphia, Pa. Manager, National Aniline & Chemical Co., 200 S. Front St.

Meyers, Chester W.—Arcadia Road, Billerica, Mass. Dyer, Massachusetts Knitting Mills, 89 Bickford St., Jamaica Plain, Boston, Mass.

Nath, Simon—2020 Middlesex St., North Chelmsford, Mass. Chemist, Lawrence Mfg. Co., Lowell, Mass.

Osborne, G. Gordon—8 Lancaster St., Cambridge, Mass. Senior Fellow, The Textile Foundation, M. I. T.

Parrett, A. Ewart—420 Waterloo St., S., Preston, Ontario, Canada. Supt. of Dyeing, Bleaching and Scouring operations, Dominion Woollens & Worsted, Ltd., Hespeler, Ontario, Canada.

Robertson, J. Douglas—92 Pearl St., North Dighton, Mass. Plant Engineer, Mt. Hope Finishing Co.

Wightman, William H.—35 Wildwood St., Winchester, Mass. Salesman, dyestuffs and chemicals, Ciba Co., Inc., 157 Federal St., Boston, Mass.

Junior:

Delaney, Robert W.—165 W. Thayer St., Philadelphia, Pa. Textile Chemist, National Aniline & Chemical Co., 200 S. Front St.

Associate:

Allen, Frank J.—Penn Athletic Club, Philadelphia, Pa. Salesman, National Aniline & Chemical Co., 200 S. Front St.

Christie, G. A.—42 N. 16th St., Prospect Park, N. J. Secretary, Treasurer and Buyer, R. G. Buser Silk Corp., 468 Totowa Ave., Paterson, N. J.

MacDonald, Roland—Alden Park Manor, Philadelphia, Pa. Salesman, National Aniline & Chemical Co., 200 S. Front St.

Quinlan, Francis T.—531 Shoemaker Rd., Elkins Park, Pa. Executive, Colonial Knitting Mills, Inc., Clearfield and B. Sts., Philadelphia, Pa.

Quinlan, Philip J.—531 Shoemaker Rd., Elkins Park, Pa. Executive, Colonial Knitting Mills, Inc., B and Clearfield Sts., Philadelphia, Pa.

Tetzlaff, Herbert W.—4246 N. 21st St., Milwaukee, Wis. Salesman, Geigy Co., Inc., 89 Barclay St., New York, N. Y.

The applications of two candidates for membership were referred back for additional information.

Two former members, G. R. Kremers and Earl A. Clements, Jr., were reinstated as Active Members.

Dr. Rose read a letter which will be sent out to all members, urging them to take out Sustaining Memberships.

It was voted to publish in the next Year Book an independent list of Sustaining and Life Members.

It was voted to present a copy of the 1932 Year Book to the Providence Engineering Society, with the compliments of the Council.

Dr. Draves announced that he had appointed S. J. Hayes and Hugh Christison as members of the Committee on Prizes, of which he is Chairman.

There was a long discussion of the Secretary's duties, and the necessity of providing adequate clerical assistance.

It was voted that the Secretary be paid the sum of $300.00 during the year commencing Dec. 1, 1933, as compensation for his services. It was also voted that the Treasurer be authorized to pay to the Secretary during the next fiscal year, an additional sum not to exceed $300.00 for clerical assistance, thereby rescinding any previous votes appropriating funds for this purpose.

It was voted that the Association pay the traveling expenses of the Secretary and the Chairman of the Research Committee to all Council Meetings, for the next fiscal year.

Adjourned.

Respectfully submitted, A. Newton Graves, *Sec.*

OCTOBER MEETING, NEW YORK SECTION

THE meeting was held on Friday evening, October 27, 1933, at the Elm Golf Club, Paterson, N. J., Mr. Henry F. Herrmann, Chairman of the Section, presiding.

. . . Preceding the technical program, a short business meeting was held . . .

Chairman Herrmann: Mr. Charles A. Seibert of the du Pont Company is going to talk to us on the subject of the application properties of substantive dyestuffs. It goes without saying that this is a very important class of colors of which tremendous quantities are used right in this vicinity. Mr. Seibert! (Applause.)

. . . Mr. Seibert presented his prepared paper . . . (Applause.)

Proceedings of the American Association of Textile Chemists and Colorists

Rate of Absorption and Affinity at Different Temperatures of Substantive Dyestuffs When Applied to Cotton and Rayon*

By C. A. SEIBERT
E. I. du Pont de Nemours & Co., Inc.

USUALLY when we consider substantive dyestuffs, it is in relation to their shade, discharge property, fastness properties or application properties as reflected in their usefulness for combinations of fibers to accomplish a specific purpose.

In practical processing the dyeing operation is usually started at a relatively low temperature and as the operation progresses the temperature is increased until it reaches what is known as boiling, but which actually approximates 200-205° F. There are exceptions, but these are usually to secure some special effect or result and generally with combinations of fibers.

The purpose of these remarks is to direct your attention to the fact that the substantive dyestuffs, including the group that is usually diazotized and developed on the fiber, possess individual characteristics in application properties in relation to the rate at which they are absorbed by cotton and rayon, and their affinity for these fibers at different temperatures.

The differences they exhibit in this respect has received very limited attention, at least as reflected in literature.

Figures are usually uninteresting, but they serve a useful purpose for reference and because this subject we are considering can only be expressed in and illustrated by figures it may appear unattractive to those who are not engaged in the practical application of dyestuffs to textiles. For this reason also what can be said regarding the subject is limited.

It will require more time than we have at our disposal during this meeting to permit you to decide if this phase of application properties merits serious consideration and determine the practical value of the figures presented.*

To read these figures would bore you, tire me, and not serve a useful purpose. However, a brief reference to some of the observations resulting from the investigation may be of value.

When applied to cotton and rayon some of the dyestuffs impart a greater tinctorial strength at temperatures between 200-210° F. than they do at 180-190° F., but when applied in circulating liquor types of apparatus, in the jig, in the continuous type of dyeing machine, for padding, and in such types of machines as the Buhlmann and Smith-Drum for skeins, the temperature is more liable to approximate 180-190° F. than to be higher. For this reason the dyeings for the strength comparisons were made at the lower temperature. However, had we used a higher temperature, while the figures would have changed they would still indicate a difference between the individual dyestuffs similar to that shown by the figures of the tabulation.

The figures in the tabulation only apply for specific conditions. If any of these is altered, the figures will also change. If dispersing, levelling, penetrating, or wetting assistants are present they may exert an influence. To what extent I do not know. A casual consideration may lead to the assumption that, because they assist levelling, it is accomplished as a result of a retarded rate of absorption of the dyestuff. This is not substantiated by our observations, because the presence of such assistants, if they actually serve their purpose, cause the dyestuffs to be absorbed more rapidly during the first few minutes and thereafter more slowly than when they are not present.

If alkali in the form of soda ash, trisodium phosphate, or caustic soda is present, the rate of absorption is retarded and probably the differences in the rate may be correlated with the differences in the pH caused by the addition of varying quantities of these substances, and probably also in the increased solubility of the dyestuffs as it is reflected in their maximum concentration of solubility at definite temperatures.

Increasing the quantity of salt used will also increase the rate of absorption and while in practice, except in

* A copy of the figures referred to was presented to each person present.

*Presented at Meeting of N. Y. Section, October 27, 1933.

padding and in the continuous dyeing operation, the salt is added during the dyeing process, for our experiments it was added at the start. This was necessary to have all conditions constant or uniform except those it was necessary to vary to secure the desired information.

Variation in the strength of the dyeings, which may be expressed as variation in the concentration of the dyestuff solution will also affect the rate of absorption as well as the affinity at different temperatures. The variations for two dyestuffs, when they are applied to cotton are illustrated by the following figures:

Pontamine Fast	Strength of dyeing in %	Temperature 185°F. MINUTES 2	5	15	30	45	120°F.	160°F.	180°F.
Red 8BL	0.5	85	95	100	100	100	110	110	100
Red 8BL	1.0	80	90	100	100	100	110	105	100
Red 8BL	2.0	75	85	100	100	100	110	110	100
Red 8BL	4.0	70	80	100	100	100	80	110	100
Red 8BNL ...	0.5	45	70	95	100	100	10	80	100
Red 8BNL ...	1.0	30	50	70	85	100	—10	50	100
Red 8BNL ...	2.0	10	20	35	70	100	— 5	30	100
Red 8BNL ...	4.0	*—10	15	25	70	100	— 5	20	100

* The minus sign — is intended to indicate that less than the quantity mentioned is absorbed.

It is interesting to observe that the majority of the dyestuffs are more rapidly absorbed by cotton than by rayon. In a few instances the rate is similar and a few dyestuffs are absorbed more rapidly by rayon than by cotton. In general, the slower rate of absorption by rayon is probably due to a difference in the physical character of the two fibers, but it may also be due to a chemical difference, rayon being a purer form of cellulose. It is also interesting to observe that the rate of absorption of the individual dyestuffs in comparison with each other is relatively similar for both cotton and rayon.

The results of this investigation confirms what we have known, that those dyestuffs which are most rapidly absorbed by rayon are those that are absorbed most uniformly by rayon fibers differing in affinity for dyestuffs.

I have endeavored to correlate the differences in the absorption rate of the individual dyestuffs with differences in their properties in other respects and while I have not succeeded in general, there is some evidence to indicate that it may bear some relation to their solubility as indicated by the maximum concentration, at or near the boil. As an illustration, the three dyestuffs, Pontamine Fast Blues SFL, SL and SRL are very similar in all their properties, but they are absorbed at different rates. The SFL and SL which are absorbed at a similar rate are soluble in a concentration of 80 grams per liter, whereas the SRL which is absorbed more rapidly than the others is only soluble in a concentration of 25 grams per liter, indicating that the greater the concentration of solubility the slower the absorption rate. Probably this only applies within certain limits because there is only a negligible difference in the rate of absorption between dyestuffs soluble in a concentration of 10 and 20 grams per liter as well as between those soluble in concentrations of 80 grams or more per liter.

I direct your attention to the fact that some of the dyestuffs impart equal or greater tinctorial strength to cotton or rayon at temperatures of 120 and 160° F. than they do at 180° F. or higher temperatures. This indicates and it is substantiated by dyeings, that the quantity absorbed at the lower temperatures is not permanently fixed, and as the temperature increases some of it redissolves into the dyebath and will not again be absorbed by the fiber unless the temperature is lowered or more salt is added. This is illustrated by three skeins of cotton which were dyed together, first at a temperature of 120° F. for 30 minutes. One skein was then removed, rinsed, and dried. The dye liquor was then divided into three equal portions, into two of which one of the remaining skeins was entered. One of these baths was then placed into a boiling water bath and the dyeing continued for 20 minutes at a temperature of 180° F. The other was placed in a glycerine bath and the dyeing continued for 20 minutes at a temperature of 212° F. A comparison of these skeins shows the latter more than 20% weaker and the former more than 10% weaker than the skein dyed at 120° F.

I do not know if the information presented will receive serious consideration for practical problems, but I can visualize its usefulness for many purposes.

I have prepared dyeings of rayon skeins with two different combinations of a blue and a yellow. The tabulation indicates that both dyestuffs used for one combination are absorbed at a similar rate, whereas in the other combination the yellow is absorbed more rapidly than the blue. There are five dyeings of each combination, all made at a uniform temperature of 180° F., but for 2, 5, 15, 30 and 45 minute periods of time. These dyeings are linked together in the order named with the tickets attached to the latter. In one set the shade of the dyeings is reasonably uniform, differing principally in strength, whereas in the other, due to the more rapid absorption of the yellow component, the shade becomes increasingly bluer as the time of dyeing increases.

I have also prepared two sets of dyeings with a blue and a yellow in combination, for one using dyestuffs which the tabulation indicates possess similar affinity at different temperatures and for the other, dyestuffs that do not. There are four skeins in each set, all dyed for a period of 30 minutes, but at temperatures of 120, 140, 160 and 180° F. They are linked together in the order named with the tickets attached to the latter. As anticipated, one combination has produced dyeings very much more uniform in shade than the other.

For padding and for the continuous dyeing process, to maintain a uniform shade, is a serious problem frequently requiring alteration in the relative proportions of the dyestuffs used in combination during the run. The information presented may prove of some assistance in selecting dyestuffs most suitable for use in combination for these methods of application.

(Turn to page 767)

For the continuous process sulfur dyestuffs are preferred and most generally used, because of their superior fastness to washing.

We hope to have available in the near future information pertaining to the application properties of this group similar to that now presented in relation to the direct and developed groups.

For use in the jig, dyestuffs that exhaust well are preferable and for other purposes various characteristics are desirable.

The tabulations include information in relation to 32 types of the developed and 138 types of the direct dyestuffs. A minimum of 14 dyeings of each dyestuff both on cotton and on rayon was required, making a total of 4760 dyeings, however, the total number actually made was in excess of 8000. I mention this principally to emphasize the possibility of errors. All the strength comparisons were checked by at least two persons independently. It was tedious work and despite every precaution slight errors may have been made in judgment or for other reasons.

Color Index numbers have not been included in the tabulation, because many of the dyestuffs have not been assigned numbers and those that have can be identified by means of reference to the year book of our organization.

The dyestuffs possessing superior light fastness appear in a separate tabulation together as a means of convenience.

Before concluding, I wish to exhibit some interesting dyeings, not in relation to our present subject, but because they indicate that under certain conditions a wetting agent may be too efficient in its action and in this respect they are very unusual.

These dyeings consist of two sets, each composed of five skeins of cotton. Skeins in each set have been dyed with 0.2-0.4-0.6-0.8 and 1% of the same dyestuff under identical conditions and the skeins are linked together in the order mentioned, with the ticket attached to the latter. The only difference between the two sets that I know of is, previous to dyeings, all the skeins in one set were treated together at the boil for 2 hours in a solution containing 2% of double sulfonated castor oil, (Monopol) and 5% of soda ash, of their weight, whereas those in the other set were merely wet out together at room temperature in a rather concentrated (2%) solution of a wetting agent. The dyeings in the latter set are all approximately 20% weaker than the similar strength dyeings in the other set. The differences in the strengths is particularly interesting because the strengths of the exhaust dyeings and other methods of measuring the quantity of dyestuffs that remained, indicate that the skeins in the set that appears weaker have absorbed at least as much of the dyestuff originally present as the skeins that appear stronger. Why this is so, I do not know.

If I may be of service by answering questions, I shall be pleased to do so, provided I can.

Discussion

Chairman Herrmann: I am sure we have all had much pleasure in listening to a real investigation or the report of a real personal investigation. The thought that 8,000 dyeings were required to present this summary to us must impress us all, and I am sure that we are very grateful to Mr. Seibert, who is the Secretary of the Philadelphia Section, for presenting to us this (I might almost call it) monumental piece of work.

I might digress for a second to express my personal opinion that it is this kind of paper that we thoroughly like to have because it is a little off the beaten path and highly instructive. Mr. Seibert very kindly volunteered to answer any questions we have to ask. So if you have any, let us have them. I will start off the discussion, if the Chair may be permitted the honor. I have noticed on many occasions that in the dyeing of mixed goods with a given direct color in a light shade, the cotton seems to take the color in preference to the rayon. In a medium shade the chances of dyeing the two alike are best, and in a deep shade the reverse occurs and the rayon takes an abundance or the greater portion of the color, so that it is difficult in a very full shade to dye rayon and cotton uniformly because the rayon is dyed too heavy.

I would like to ask Mr. Seibert whether in his work he has found any real explanation for this, whether the absorption lines seem to cross at some one point, whether this is typical of all colors or is limited to a certain selection of them and if it can be overcome by the addition of any special agent or the control of temperature, salt concentration, pH or any other means available to the dyer?

Mr. Seibert: Mr. Herrmann, I think I can answer your question by stating it is a known fact that every direct or substantive dyestuff possesses the characteristic that in weak shades cotton will absorb more of it than rayon. If you take an average of the dyestuffs, I should say that you cross, or you come to the point where both fibers possess a similar affinity as reflected in the strength and the shade being more uniform, when you use six ounces of dyestuff per hundred. Below that point they are all absorbed by cotton to a greater extent than they are by rayon, excepting Bemberg rayon.

As you increase the concentration of dyestuff or strength of dyeing above that point, the tendency is in the opposite direction. We have tried to counteract that tendency by the addition of various substances to the dye bath and while literally not correct it would be figuratively correct to say that the things we have tried, include about everything from cheese to salt, but they did not do the trick.

There is only one way that we know which will counteract or minimize the tendency. In dyeing mode shades or when you use quantities of less than six ounces of dyestuff per hundred pounds of material, you can overcome the tendency of the cotton to take more of the dyestuff than the rayon by starting your dyeing, or entering your material at a boiling temperature and, if you can add enough salt, you can counteract it entirely or force more of the dyestuff onto the rayon than goes onto the cotton, but at the expense of a possible too rapid absorption, resulting in unlevel dyeings.

Now when you go to the other side, into full shades, again temperature is the only means we have found that really aids us consistently and, in that case, you must use a lower temperature, and the lower the better. At 120°F, you counteract it very much and if you could go low enough you would counteract it entirely, and produce a uniform shade even in full shades. However, so few of the dyestuffs have sufficient affinity or exhaust sufficiently to be economically useful at those low temperatures that this means is impractical, but it is the only way that I know of to counteract the tendency.

Chairman Herrmann: Thank you. Have we some more questions?

Mr. Drew: I would like to ask the speaker if he found that cotton which was wet out by the ordinary assistants consistently produced stronger dyeings than cotton wet out with wetting assistants, or whether it was just this one wetting assistant.

Mr. Seibert: It was only with this one particular wetting agent that I noticed this peculiarity and it was so interesting to me that I decided to direct your attenion to it.

Normally such a difference does not occur.

When I said that if you use an efficient wetting assistant, it actually increases the absorption rate for the first few minutes, I did not mean to indicate that it is visible in the strengths of dyeings, because frequently it is not. Why, I do not know, unless the assistant penetrates the fiber more quickly and, draws the dyestuff with it. I made that statement on the fact that when it is actually measured, that is measuring the quantity of dyestuff left in the beaker or dye vessel after any given time, during the first few minutes it will show that in proportion to the quantity that was there to start with, there is actually more taken out in the first few minutes when you have an efficient wetting agent present than there is when it is not used.

Mr. Drew: This assistant is more efficient than some others due to the fact that you get more penetration or something of that sort?

Mr. Seibert: Possibly. I don't know positively; I cannot answer that question with assured accuracy. In this connection, there is something we should remember and that is, it is possible that the wetting assistant has combined with the dyestuff and that is by no means an impossibility. It may combine with the dyestuff to form a compound which in this instance is colorless.

There are some substances which have been offered as retarding agents that have the peculiar characteristic to combine chemically or physically with the dyestuff, (vat dyestuffs in particular), and form other compounds which are colorless and if absorbed by the fiber they would not be evident visually.

There are so many interesting things that come up in an investigation of this kind that you could talk about them for an endless time, but unless you see them they are not easily described, or my powers of description I fear are not equal to describing them as interestingly as they appeal to me when I see them.

Mr. Drew: Thank you.

Mr. O. W. Clark: Where was this wetting out agent used?

Mr. Seibert: Just for wetting out the yarn prior to dyeing.

Mr. Clark: Does it work all right in the dyebath?

Mr. Seibert: Really, I don't know. I have not tried it.

Mr. Ephraim Freedman: As I understand it, with these particular dyeings you either have some leuco compound formed or else you have better penetration with the wetting agent than you have with the other. With the other you may have surface dyeing.

If it is the wetting out agent that is affecting the color, wouldn't it be possible to add some wetting out agent to a fixed amount of your dyestuff in solution and measure that in the colorimeter against the same amount of dyestuff in solution without the wetting agent? Wouldn't that tell you if the wetting agent is affecting the dyesuff itself?

Mr. Seibert: Yes, there is no question about it. We did something similar, but used the spectrophotometer.

When we prepared the dyebaths we preserved a portion and dyed the skein in other portions and then measured the differences in the quantities of dyestuffs present in the used and unused portions, and found that the used portions in which the wetting agent skeins were dyed actually contained a trace less dyestuff than the used portions in which the other skeins were dyed.

Mr. Freedman: I don't think you have my point there. Have you prepared solutions of the dyestuff, with and without the wetting agent and compared them in the spectrophotometer?

Mr. Seibert: No, because we used the wetting agent as a preparatory treatment for the skeins and not in the dyebath.

Mr. Freedman: Well, the point I have in mind was to try to bring out whether or not it was this wetting out agent that affects the color or the intensity of color, or whether it is due to the wetting out agent permitting the

dyestuff to penetrate into the fiber itself more thoroughly than by the other method.

You may have more surface dyeing in one case and more uniform penetration in the other.

Mr. Seibert: That is very true. That may be the cause. Of course we could only ascertain that by comparing cross sections of the threads under a microscope. That is something we did not do.

Mr. Freedman: What I was driving at in bringing this up for discussion was whether or not one particular yarn or a yarn dyed in one fashion would as a result of that particular treatment resist, let us say, more washing than another where you have surface dyeing. It is quite likely that the friction and the action of the detergents in the laundry wheel might remove a good deal of the dyestuff and cause a more rapid change or alteration of color in the one case, while in the other the yarn may be able to undergo several washings without any noticeable change.

Mr. Seibert: That, of course is possible.

Mr. Drew: Might I ask if that wetting agent is recognized as an efficient wetting out agent?

Mr. Seibert: Yes, sir. I consider it such.

Mr. Drew: The reason I brought it up is that normally, (I think most everyone will bear me out) when you use a wetting agent you get a deeper shade. I think this case is the unusual rather than the rule.

Mr. Seibert: Absolutely. That is why I brought it up.

Chairman Herrmann: I think I should ask the Program Committee to take recognition of the membership's interest in wetting out agents. It may make a very fruitful subject for an evening's discussion. We have gotten somewhat away from the main subject of the evening, which was dyestuffs. The hour is getting late. Are there any further questions?

Mr. Bell: I would like to ask one more question which I think will not take very long to answer. In handling rayons, you frequently come across fabrics containing yarns which are defective in so far as having different affinities for dyestuffs. This can be overcome to some extent by the proper selection of dyes and control of temperature, etc. Does your tabulations give any information in relation to the most desirable dyestuffs to use for that purpose?

Mr. Seibert: Yes, the tabulation indicates the affinity at different temperatures. I believe it is agreed that the dyestuffs which are absorbed in the greatest quantity at temperatures below 160° F., will dye rayon of varying affinity more uniformly than dyestuffs which exhibit their greatest affinity at higher temperatures than 160°F. This is in agreement with what Whittaker tells us, and I believe he is one of the most, if not the most reliable authority regarding this subject. If you are interested, you will find articles by him in relation to the subject, in the Journal of the Society of Dyers and Colourists, starting back in 1927 or thereabouts. Excerpts from them have also appeared in some of the American technical publications.

Chairman Herrmann: I should like to call for a motion for a rising vote of thanks to the speaker.

The members arose and applauded.

Chairman Herrmann: We will stand adjourned.

The meeting then adjourned at ten o'clock.

Note: The tables referred to in this paper will be published in the January 1, 1934 issue of THE REPORTER.

UNEMPLOYMENT REGISTER

(Continued from page (388) 780)

Experience—Eleven years experience as chemist and boss dyer on the following: woolen, worsted and cotton yarn; woolen, worsted and union piece dyes on both ladies' and men's wear; wool, cotton, shoddy and mohair raw stock. Age 33, married, will go anywhere. References.

B-9

Experience—Hosiery dyer with fifteen years' experience on high grade silk hosiery; familiar with all types of machines. Age 43, married. Will go anywhere. References furnished.

B-10

Experience—Ten years in top dyeing for fancy men's wear trade, knitting trade and sports wear; also piece dyeings on men's wear, crepes, sports flannels and tropical suitings; also several years association with commission dyeing trade doing tops, worsted skeins, cotton skeins, piece dyes, peroxide bleaching, naphthols, mohair plushes and imitation caracul cloths. Familiar with many types of machines. 38 years old, single with dependents. References.

F-1

Education—Textile Institute, Alexander Hamilton Inst., Extension work at Brown Univ., working knowledge of German.

Experience—Has had executive departmental work with all types of textiles manufacturers. Acquainted with all types of textile machinery, dyestuff application, laboratory practice, cost methods, and checking methods and processes. References.

Proceedings of the American Association of Textile Chemists and Colorists

UNEMPLOYMENT REGISTER

Members of this association, who are without employment, should forward to the secretary a statement as to their qualifications and experience. This information will subsequently appear on these pages with an identifying key number. Employers are also requested to file with the secretary any vacancies which may occur in their businesses.—A. Newton Graves, Secretary, care Franklin Process Company, Providence, R. I.

Key: A—Laboratory and research; B—Dyeing or printing; C—Finishing; D—Sales; E—Instruction; F—Executive

NOTE. Persons who have obtained employment should notify the secretary at once. Prospective employers may file vacancies either with the secretary or the AMERICAN DYESTUFF REPORTER.

A-2

Education—B.T.C., Lowell Textile Institute, 1932; also course in shorthand and typing.

Experience—None to date, interested in quantitative analysis, experimental dyeing, color matching, dye testing and dye identification. Ability to learn quickly and will go anywhere. 23 years old, single.

A-B-2

Education—Lowell Evening Textile School, 1917.

Experience—Five years' experience in hosiery dyeing, full fashioned hosiery of silk and cotton and silk, also men's hosiery containing rayon, wool, cotton and celanese. Several years experience in laboratory work. Has also had experience in jig-dyeing of cotton piece goods, slub and top dyeing.

A-E-2

Education—B.T.C., Lowell Textile Institute, 1933.

Experience—Assistant instructor in chemistry, Lowell Textile Institute. Member of scholastic honorary fraternity.

A-B-C-1

Education—Graduate Industrial Chemical Engineer, Pratt Institute—1911.

Experience—One year as plant control chemist, 4 years as laboratory chemist with gas company, 13 years as plant chemist with bleaching, dyeing and finishing plant. (Rayon and cotton piece goods). Formulated processes and put them into plant operation, 1 year as chemist and demonstrator for dyestuff company, 1 year as superintendent colorist with print works printing linen and rayon, 1 year as director of testing laboratory for national dry goods concern.

A-B-E-1

Education—B.S. in chemistry at C.C.N.Y. Working now on M.A. at Columbia.

Experience—7 years as dye tester and color matcher for dye manufacturer; 6 months skein silk and rayon dyer; 4 years textile chemist and dyer for cotton finishing concern; 2 months boss bleacher and 4 years as teacher of organic chemistry and dyeing. Age 38, single.

A-E-1

Education—Ph.D., Univ. of Illinois, studied chemical engineering at Columbia, licensed chemical engineer, New Jersey.

Experience—10 years' experience teaching in colleges, subjects included chemical and textile subjects. Has had broad experience in industrial work including experience in testing materials, research and consulting. Will go anywhere; references.

B-1

Education—Educated and trained in chemistry and calico printing in Glasgow, Scotland.

Experience—Has been with large print works as colorist for 13 years producing first class work on cotton, rayon, wool and silk fabrics. References.

B-2

Experience—Boss dyer with one firm for 18 years, divisional supt. at print works for 1 year, in charge of processing and dyeing of cottons and rayons at large bleachery for 6 years. Prefers bleachery in East but will go anywhere. References.

B-3

Experience—Foreman piece dyer for the past 21 years. Can dye the following; celanese, rayon, cotton lacks, wool, silk and mixed fabrics. Has knowledge of finishing and laboratory work.

B-6

Education—Graduate R. I. School of Design.

Experience—5 years in bleachery, 7½ years as assistant dyer, 2 years as boss dyer and 3 years as superintendent of dyeing and finishing. Married, 33 years old. References.

B-7

Experience—4 years as assistant to manager in ribbon mill; 2 years as boss dyer on veils, chiffons and silk skeins; 5 years as boss dyer on ribbons and skeins (cotton and silk); 7 years as boss dyer on spun silk (pure dye and fast) resisted colors; last 12 years as hosiery dyer on silk and cotton, silk-cotton, rayon or wool. 50 years old, married. References.

B-8

Education—Chemistry and Dyeing Department, Philadelphia Textile School.

(Turn back to page (387) 779)

AMERICAN
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WHO SHOULD PAY FOR RESEARCH?

AN interesting point was brought up at the Annual Meeting of the American Association of Textile Chemists and Colorists held on December 8th. It was stated that there was an undertone of comment prevalent today to the effect that research, which is being conducted for the benefit of industry, is not receiving the proper financial support from industry. The fact that such is not absolutely true was indicated when it was shown that a great deal of the money available for the research carried on by this Association is furnished by industry, directly or indirectly.

Among those who help to carry on the research work of the A.A.T.C.C. is the Textile Foundation which annually donates a sum of money. This money which the Textile Foundation donates originally came from industry. Corporate memberships can also be considered as a direct contribution from industry to research. The support of those firms who purchase advertising space in the Year Book can likewise be considered a contribution to research. And then at the Annual Meeting, an offer was made by Paolino Gerli, President of the International Silk Guild, Incorporated, to establish one or more fellowships to carry on research in the silk field. The acknowledgment of Dr. Rose to this offer would indicate that such offers are more than welcome in carrying on the valuable research program of the Association.

It then becomes evident that the lack of support for research **charged to industry is not entirely** justifiable although it is the opinion of some that there should be more donations by the industry which is benefitted by research. There is apt to be a difference of opinion in this respect but it cannot be denied that the work of the A.A.T.C.C. would be seriously hampered if it were not for the support it now receives from industry.

While on the subject we think it appropriate that the American Association of Textile Chemists and Colorists should be complimented for the amount of valuable research which they have contributed in spite of the limited amount of money available. In this respect we should not lose sight of the amount of time and energy expended gratis by the various sub-committees and their chairmen in carrying out the program of the research committee. One of the objects of the Association is "to encourage in any practical way research work on chemical processes and materials of importance to the Textile Industry"—To any one present at the Annual Meeting or to anyone who reads the Year Book the extent to which this theme has been carried out and continues to be carried out becomes readily apparent.

To the officers who will carry on the work of the Association for the coming year,—those who continue in office and to the new members elected—and to the members of the various committees we wish to offer the continued support and cooperation of the AMERICAN DYESTUFF REPORTER.

KILLHEFFER RETIRES

Former President of Newport and of A.A.T.C.C. in Poor Health—Elected Honorary Member of S.O.C.M.A.

ELVIN H. KILLHEFFER, long a prominent figure in dyestuff and textile chemical circles, has retired, at least temporarily, from active business. Effective December 1st, 1933, he was granted an indefinite leave of absence by E. I. DuPont de Nemours & Co., of whose Fine Chemicals Division he was Manager.

Although Dr. Killheffer had long planned retirement for himself in the not distant future, this action was hastened by the growing frequency of heart attacks which, he was advised, would become serious unless all exacting duties were relinquished.

Dr. Killheffer's career has been one of unusual interest. Graduating from Philadelphia Textile School, he entered the employ of Kalle & Co. and at the outbreak of the World War was their chief application chemist. Realizing that a dyestuff famine impended and that great stocks of dyes were available in the Far East he organized the Orient Trading Co. for the purchase of dyes in China and Japan and their sale in America. He took up his residence in China and personally conducted the purchase negotiations.

The operations of the Orient Trading Co. were most successful and, upon his return to this country, Dr. Killheffer used a portion of his profits in establishing the American Color Manufacturing Co. at Passaic, N. J.,

where, under his direction, a number of valuable dyestuffs were produced for the first time in America.

In 1918 Dr. Killheffer negotiated an arrangement with the Newport Company whereby they acquired American Color Manufacturing Co. and a new Corporation, Newport Chemical Works, of which he became Vice-President, was organized to handle the sale of all Newport dyestuff products. He continued to direct the destinies of Newport, of which he later became President, until its sale to E. I. duPont de Nemours & Co. in 1931.

Dr. Killheffer is a charter member of the American Association of Textile Chemists and Colorists and has always been most active in its councils. Upon the retirement of Dr. Louis A. Olney in 1927 from the chair which he had occupied continuously since the organization of the Association Dr. Killheffer was elected to the presidency of the Association, was re-elected in 1928 and again in 1929.

Dr. Killheffer has been an active officer of the Synthetic Organic Chemical Manufacturers Association almost continuously since its organization. He has been a member of its Board of Governors, its First Vice-President and continuously Chairman of its Tariff Committee. In the latter capacity he took a leading part in conducting the case of the dyestuff manufacturers before the Ways and Means Committee of the House and the Finance Committee of the Senate when the question of protection for the dyestuff industry was under discussion. At the annual meeting of the S.O.C.M.A., December 7, 1933, when Dr. Killheffer's retirement was announced he was elected an honorary member "in recognition of his long and loyal service to the Association."

Dr. Killheffer is the owner of a delightful winter home on the St. Lucie River near Stuart, Florida, and of a summer home near Great Barrington in the Berkshires. He plans to divide his time between the two in quest of complete restoration of his former robust health.

New Patents

(*Abstracted by S. O. C. M. A.*)

Azo Dyes and Their Production. (Comprises tetrazotizing and coupling 3.3'-diaminodiphenyl urea with salicylic acid and 1-amino-5-naphthol-7-sulphonic acid; dye regenerated cellulose even level shades varying from brown to bluish-red.) Rainald Brightman and William Leslie Baber Wellacott, Blackley, Manchester, Eng., assignors to Imperial Chemical Industries Ltd., Westminster, Eng., No. 1,933,585, No. 7, 1933.

Azo Dyestuffs and Their Production. (For example, comprises coupling diazotized 5-nitro-2-anisidine with *w*-hydroxy-ethyl-*a*-naphthylamine; particularly suited to the coloration of cellulose acetate, yielding scarlet to orange to red shades. A continuation in part of co-pending U. S. applications S. Nos. 297,098 filed 8/2/28 and 363,707, filed 5/16/29.) George Holland Ellis, Henry Charles Olpin, and Denis Houghton Mosby, Spondon, near Derby, Eng., assignors to Celanese Corp. of America, No. 1,935,624, Nov. 21, 1933.

Bradford Durfee Alumni

The New York Alumni Section of the Bradford Durfee Textile School held a regular meeting Tuesday evening, December 5th, at the Cabin Grill Restaurant, 490 Seventh Avenue. About 25 members were present including two of the officers of the New Bedford Alumni Association, A. H. Raine, Secretary, and J. F. Hogan, President.

A paper dealing with the manufacture of cotton from raw to the dyed and finished state was presented by a committee. The paper was very well received and, pending the approval of H. W. Nichols, principal of the Bradford Durfee Textile School, will be delivered at that institution at some future date.

BOOK REVIEW

A.S.T.M. Book of Standards, A.S.T.M. Headquarters, 1315 Spruce St., Philadelphia, 2300 pages in two parts, $14.00, one part alone $7.50.

The American Society for Testing Materials has just issued its Book of A.S.T.M. Standards, a triennial publication containing all of the standard specifications, methods of test, recommended practices and definitions formally adopted by the Society. The 1933 issue of this publication is composed of two parts—Part I containing all A.S.T.M. standards covering metallic materials; Part II, all standards relating to non-metallic materials. Both parts aggregate 2300 pages.

In both parts of the book, the specifications for a particular class of material are given first, followed directly by the test methods, definitions, etc. A complete subject index is included in which each standard is indexed under the principal subject covered, keywords being given in alphabetical sequence. This index, together with two tables of contents, one listing standards by the materials covered, the other in order of numeric sequence of the designations greatly facilitates the use of the book.

Of the 185 standards in Part I, 104 cover the ferrous metals, steel, wrought iron, pig iron and iron castings and ferro-alloys, while 70 relate to non-ferrous metals, including aluminum and magnesium alloys, copper and copper alloys, lead, nickel, zinc, bearing metals, solder metal, deoxidizers, electrical-heating and electrical-resistance alloys. Eleven of the standards involve metallography and general testing methods.

Included in the 285 standards contained in Part II—Non-Metallic Materials—are specifications and test methods covering a great variety of materials, including tire cord, cotton sewing thread, asbestos yarns, knit goods, duck and miscellaneous textile materials.

Choice of a

Strength Test for Yarn

By **CHARLES F. GOLDTHWAIT**

Senior Industrial Fellow, Mellon Institute of Industrial Research, Pittsburgh, Penna.

THE chemical laboratory frequently has occasion to test yarns for strength in connection with damage or defects and in the course of research, if not as a matter of routine. Where there is enough of such work to become routine it is important to obtain results without consuming too much time, and results that yield the most useful information possible, with reasonable accuracy.

The strength tests quoted with chemical work often indicate that they are considered merely routine, but that is not at all the case until somebody has used care and thought in the choice of the most suitable test for the purpose, or at least the best test that can be made with the apparatus available.

The author has used the single-strand test in its loop form very extensively in connection with yarn research and has found it better in most respects than the skein test. It is readily adaptable to routine work and might well find more recognition in yarn testing laboratories. It is the present purpose to show how readily it can be used for a great variety of work, and that it has numerous advantages. It is not, however, the intention to enter into the well known controversy over the choice of the skein or single thread test as a general standard method. Whether a given test will be best for any specific purpose will depend upon whether the character of the test and of its results suits the object in view. It is believed that the discussion which follows will help in making such a choice of methods, especially in connection with research on processing.

Any test for the breaking strength of yarn amounts to a comparison of the weakest spots in a sample with some standard figure, or with the weakest places in some other sample. Few tests, even in research work, fall very far from this broad characterization. As a means of obtaining such a comparison the more or less arbitrary skein break has been adopted, largely by reason of its convenience, as the usual test for the strength of yarns.

While it is an acceptable test for many purposes it does not give anything like an exact tensile strength of the yarn. It suffers not only from the usual objections to multiple strand methods, but also from yarn slipping. The yarn starts to break (supposedly) at one of its weakest points, but from then on it is slipping and the breaking becomes largely a matter of chance, the strands that are weakest or those that remain tightest breaking next. Fortunately the final readings are usually consistent and give reasonably satisfactory averages.

It is stated that over-lapping of the different threads in the skein may cause as much as 15 per cent error. The strength recorded has been estimated as 50 to 90 per cent of the actual yarn strength, the usual value being about 75 per cent.

The writer believes from the experience of making thousands of single-strand breaking tests that the skein method is not so much better or more convenient as frequently supposed. By single strand is meant the loop test where the yarn is looped from the lower clamp in a tester around the upper support and back to the lower clamp, as commonly used in the thread trade. This is not strictly a single-thread test but will be regarded as such for the present purpose.

It is proposed to show in this article that the single-thread break is a very good test for some yarns, the author's experience being mainly on two-ply cotton knitting yarns where the test is very satisfactory. It is not the intention to argue for its general substitution for any other test, or to suggest it for all kinds of yarns. There are times when the test is extremely useful, and while it may not be as rapid under all conditions, it will accomplish more than the skein test if properly handled for it will indicate the uniformity of the yarn and, if desired, the elongation-at-the-break. Many millions of pounds of commercial yarn come within the range of the methods that will be discussed and of suitable testing equipment.

If more than a mere comparison is desired this test can be made to come nearer to the true breaking strength of the yarn. However, the possible use of the single-thread test for the same general purpose as the skein

break does not necessitate any extended analysis of either. It is merely necessary to show that the former can be made to conform to the latter to yield just as useful results as well as some additional information.

The single-thread test is at its best in laboratory work where the units of yarn are small skeins which can be cut across and threads drawn immediately for testing; or where samples can be taken in some such place as across a warp. We shall consider mainly the testing of rather fine yarns. One of the difficulties in comparing two methods is in deciding what are equivalent samples, as well as what are equivalent tests. The methods of the American Society for Testing Materials can be taken as a basis. Their skein test of 1930 specifies a sample of four bobbins from each case of yarn, three tests to be made from each bobbin, or twelve in all. Their single-strand specifies 4 breaks from each of 10 bobbins, or 40 breaks in all. Apparently these are intended to be equivalent tests, and if so, it requires 3 1-3 single-strand thread tests to replace one skein test.

Results have been published where 4 single-thread tests were taken as equivalent to a skein break. However, it has been determined by the British Cotton Industry Research Association that 8 single-thread tests give an average as precise as the result of a skein test. The latter, therefore, has the statistical significance of 8 single thread tests and not 160 which is the number of strands between the hooks or rollers of the testing machine. Very variable yarns may require more tests and constitute a special problem.

Omitting for the moment the question of sampling, and continuing with the test itself the first point to decide is the length of the test piece. In general yarn appears stronger as the length of the test piece shortens, because with a shorter piece there is less chance of it containing a weak spot, and the average break is higher. The usual sample length is a foot or less, very frequently ten inches, the present A. S. T. M. standard.

The shortest effective length in the skein break is 54 inches, the circumference of one turn. Since the author employs a widely used make of single-strand tester that will take a loop of 36 inches of yarn, such as used in the thread trade, this was taken as the standard test piece. For the present purpose there is no objection to this length for it is still only two-thirds of the length between supports in the skein test. Nor is there any objection to the loop form because the yarn merely goes around one support just as it goes around both in the other form of test, and it is not as free to slip.

Also, half the value of the loop test gives a fairly good approximation to the actual yarn strength.

The great advantage of the loop is that it needs be fastened at but one point. There is only one knurled head to fasten and unfasten with each piece of yarn broken, instead of two. The saving of half this time is a large item if many tests are to be made.

By following this procedure and omitting readings of the elongation-at-the-break the test pieces can be broken easily at the rate of two a minute. With suitable yarns three a minute can be broken after sufficient practice. If, however, the weight has to move for nearly the full length of the quadrant, as when the breaking strength is near the upper end of the scale, the work may go a little slower. Elements in this high rate of speed are the laying of the sample out flat in a convenient position, if it is a cut skein, with the closed end around a nail or other convenient support; and the carrying in the head of the figures obtained for breaking loads, stopping only at every fifth break to write them down.

Having made the required number of tests an estimate of the apparent evenness of the yarn can be made by inspection or by the presence of excessively low spots; or better, of course, the data can be submitted to statistical treatment.

The elongation-at-the-break can be obtained with the loop test as well as with the straight single-thread test but at the expense of a little more time for noting the readings, the extra information frequently being well worth it.

Coming now to the matter of sampling, one argument for the skein test is that more yarn is tested. Omitting the fractions of leas sometimes used for ply yarns, to which the same general principles will apply, the 120 yards is not in any sense all broken. Even at the time the pointer comes to rest, which allows all the breaks that are of any use, the yarn is broken in less than 80 places which is the total number of possible breaks on one side of a skein.

Clearly, from a previous paragraph, if one has drawn 8 single thread samples from this skein and broken them instead of the whole skein he would have had a result just as valuable (although it might or might not be as convenient for some specific purpose). If, therefore, one takes his samples in the usual manner for making skein breaks and just as many of them, cuts them and draws at random 8 single threads from each he has had just as good a test and the argument of testing more yarn has disappeared. It would undoubtedly be better to run more of the single thread breaks from each skein as it takes very little time after the samples are once prepared but it would not be necessary for ordinary work.

An advantage of the skein test is that the broken yarn can be weighed for count. If the yarn lot is sampled in the same way, as suggested above, the skeins can be reeled, weighed for count before testing and then cut across and used for the single thread test. The advantage of using the skein for count is not lost, and there is no loss of sample skeins by getting them out of shape while transferring from the reel to the testing machine.

The single strand test is especially convenient for warps. According to the standard procedure (A. S. T. M.) the test for yarn on a beam is more troublesome

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Collaboration in The Print Works

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of the latter type comes to mind when a basic discharge red was being used, containing a large quantity of rhodamine. It was discovered that this color began to streak and score very badly after printing a few pieces, every time it was in use. On removal of the doctor blade the edge was found to be covered with a mass of almost pure rhodamine proving that separation had occurred, due in all probability to bad solution of the color. As acetic acid was not a safe solvent to use on account of the pattern being a discharge on a dyed ground recourse was had to a new product now on the market. The color was also boiled and cooled back before the addition of the reducing agent. The result was the disappearance of the trouble.

In certain types of cloth and pattern one of the first essentials is good penetration, that is, the colors must show almost as well on the back as on the face of the cloth. It is possible that one of the reasons for this requirement on the part of many customers is that they are well aware that a prospective buyer will look more favorably on a well penetrated overall for instance than on one which has practically no color on the reverse side of the material. To the uninitiated mind penetration of color gives an impression of fastness which is hard to shake until washing day comes along. As well as this there is the very good reason that a pattern which shows equally well on both sides of the cloth has a much better appearance all round. For very expensive fabrics duplex printing machines are used to get this effect but it is only for the best materials that such expense can be incurred.

Regarding this matter of penetration—(a note by the way)—an overall was handed to the writer an hour or so before penning this paragraph with the remark that "those colors should be fast—see how well through they are." On the overall was a label bearing the very ambiguous inscription "Aprons and Children's wash-goods" which was very evidently intended to create the impression that the goods would stand household washing. The shop assistant averred that they would wash well. On examination, however, the goods were proved to have been printed with very loose colors (rhodamine reds, etc.), on a very poor quality cloth, back-filled with starch in the finish. Even a rub with a damp cloth brought off a large proportion of the color and the goods did not seem even to have been washed after printing. The back-fill finish would also indicate this as by this method the danger of the colors bleeding during finishing would be largely obviated.

To come back to the problem of providing colors that will give good penetration, no more effective agent than gum tragacanth is known. The Dutch thickenings mentioned also give good results in this respect, while the writer has known very good work to be done by the use of another new product. In the latter case block prints on heavy cambric have shown as good an impression on the back as on the face of the cloth, a result which would be impossible by any other means, tragacanth perhaps excepted.

Gum tragacanth is usually used at 8 oz. per gallon and is first of all steeped for 24 hours before boiling for 1-2 hours. Stronger solutions can be made up and diluted with water as required but an 8 oz. solution is sufficient for most purposes. It is seldom necessary to use tragacanth with British gum but where starch colors are concerned it is more often necessary than not as starch by itself is not a good penetrative medium. In order to make certain that the mixture is absolutely homogeneous it is best to boil the thickenings together when possible, although quite good mixtures can also be obtained by a thorough stirring before adding any other ingredients.

The use of tragacanth has advantages besides the better penetration obtained, one being that colors thus made up are much more easily strained, another being that it gives body to a color that would otherwise lack this rather elusive property. It sometimes happens that a starch color apparently having plenty of body is sent out for printing, only to be returned as being unprintable on account of bleeding at the edge of the print. There may be many causes of this failure such as would take a good deal of research work to discover, possibly in the nature of the starch used, the length of boiling time, the method of mixing, the length of time kept before using, etc. It has been found that the cure for such ills is the addition of tragacanth or if tragacanth is already present the addition of more. It is probable that such additions absorb all the surplus moisture which is not being held sufficiently well together by the starch media and so prevents the flushing and bleeding effect alluded to.

The thinning of colors to make them suitable for certain types of pattern is a fairly easy matter compared with the problem of thickening them and making them penetrative but even here one can quite easily go astray by

injudicious additions. For instance, to thin a starch color, a tragacanth containing color and a British gum or dextrin color are three very different problems and each must be approached in its own way. In the first instance a wheat starch and flour thickening will not as a rule need thinning very much as such colors are usually made up for printing dark colors in small objects, fine lines, etc. Occasionally, however, in coarser fabrics such as crash linen such colors can be used with safety and profit and it is here that they will need to be thin. As a rule when such fabrics with suitable patterns are to be printed some slight difficulty is experienced in obtaining penetration of the fabric, until the right consistency of color is obtained. This is usually found by trial, the printer starting off with rather thicker color than he is likely to require and with the aid of the color mixer having such additions of thin color made until the whole mixing is just right. This mixing will then be a guide for all subsequent mixings for the same pattern in repeat orders. As mentioned before a starch and flour thickening can only be thinned very cautiously as it quickly loses its viscosity on addition of water. With such colors, additions of this should not be made by the printer but only by the color mixer who knows of what thickening the color is composed and can act accordingly.

A starch and tragacanth mixture will, however, need to be treated rather differently, as it will stand a good deal more thinning than the previous type. A starch tragacanth color which looks very thick will be found to work quite well in the printing machine. Whereas if it were thinned to the same apparent consistency as the starch-flour or British gum type it would probably prove to be quite unworkable. Tragacanth alone is sometimes used for screen printing and for this purpose may be used at almost the full thickness of an 8 oz. solution. This will appear very thick indeed to the printer but the penetrative properties of the tragacanth are such that the color will give an excellent impression in spite of appearances.

Lastly there is the other commonly used thickening agent, viz. British gum which is perhaps easier to handle from every point of view than any of the others. Were it not that a large proportion of the tinctorial value of the color is lost by the use of British gum it is safe to say that no other thickening could rival it for general printing properties. This thickening can be thickened or thinned, without much risk either way unless unreasonable methods are adopted.

The writer remembers well a foreman color mixer who would use nothing else but British gum for all his colors. His idea was to get clean sharp edges on all the prints, which consisted largely on handkerchief styles. The result was to say the least, expensive. He certainly got clean sharp edges and lines but at what a cost, having to use in many instances for dark colors 10 per cent of dyestuff where with other thickenings 5 per cent or even less would have served his purpose.

An important matter in which the color mixer can be of assistance to the printer is in the sightening of colors. This is a matter to which more attention ought to be paid, as by means of such additions of suitable coloring matters to otherwise colorless printing pastes, printers can spot damages immediately and take the requisite precautions to prevent their continuance. There are several types of colors which need sightening, viz. aniline black, indigosols, rapid fasts and rapidogens, all of which are printed from more or less colorless solutions. In the early day of printing by block one of the first sighteners to be used was very finely ground charcoal, an addition of which gave a grey tinge to certain of the mordant thickenings, such as alumina, which had little or no color of their own. Aniline black could also be treated similarly if necessary. The French also used Persian berry extract as a sightening agent for alumina mordants with success.

To come to the sightening of aniline black for machine printing, this is a simple enough problem, all of the basic colors being useful for this purpose, the rhodamines in particular being most in requisition. Even if a rather larger quantity than is necessary is added it can quite easily be removed by the final clearing or chemicking of the goods before finishing.

The sightening of the indigosols give more pause for thought as there is a wide range of colors to be considered. In the case of aniline black it is not possible for a reasonable addition of any color to alter the tone of the black, but with indigosols each color must be sightened with a color as near as possible to its own shade. Most of the dyestuff companies can furnish information in this respect.

The other colors to be considered in this connection are the rapid fasts and rapidogens, here we are confronted with a new problem.

So far as the writer is aware only two solutions have been put forward neither of which is very satisfactory. The first is rather ingenious, consisting as it does of the addition of phenolphthaleine to the aklaline printing color thus tingeing it pink. To make this device of any practical utility would necessitate the addition of far too much phenolphthaleine and so the method has come to be largely discarded by practical men.

The next solution is to add ultramarine blue so as to produce an olive color. This is certainly a better proposition but here again the difficulty arises that it would take too large a quantity to do the job thoroughly. If sufficient ultramarine be added, however, some degree of sightening is obtained which makes the method a little bit more serviceable than the other as regards being able to see the color well enough to keep it in register.

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AGEING VAT PRINTS

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The sides of the machine do not come in contact with this source of heat and the portions of the rollers uncovered by cloth are also freely in contact with circulating steam. There is likely to be a temperature gradient from the centers of the rollers to the sides with a consequent greater fixation of color on the selvedges, and the more near ideal are the conditions at the sides the more noticeable will be the effect. To prevent this the printer is obliged to render the conditions of the whole of the machine less efficient, as otherwise the majority of his production may become jobs.

Unless maximum color value can be obtained regularly and consistently it is of little value, for the saving in color cost would be far outweighed by the increase in the allowances account.

Cloth bunched at the printing machine is allowed to condition at the selvedges whereas the insides of the bunches remain hot and dry. To reduce faults from this cause it is common practice to run the cloth immediately prior to entering the ager over a cylinder containing cold water. Unless there is a conditioning period after cooling this remedy can only be partially effective.

The perfect ager is not built as yet, and no one processing vat dyes appears to be in a position to state that his vat styles cause no trouble. Nevertheless modern methods are giving more regular results.

Alizarine Light Brown BL

Beyond the consideration of its extreme light fastness, this product is said to be well received by raw stock dyers who are faced with the necessity of covering unlevel dyeing blends uniformly in light tan shades. This product is also said to have unusual merit in dyeing such combinations as worsted noils and "tippy wool" a solid and uniform shade, thereby eliminating the difficulty heretofore experienced in securing representative samples of such a blend. Further particulars may be obtained from the Sandoz Chemical Works.

Shoe and Leather Colors

The 1934 Spring Shoe and Leather Card, presenting two high style and seven classic staple colors for women's shoes, has just been issued by the Textile Color Card Association to its members, it was announced recently by Margaret Hayden Rorke, managing director. These are the official shades chosen in cooperation with the joint committee of tanners, shoe manufacturers and retailers.

The high fashion colors are Spring Taupe, a smart lighter version of the darker taupe or eel grey tones of this Fall season, and Biscay Brown, the new Spring interpretation of light brown.

Knitted Outerwear Colors

Sixty-four colors for the coming Spring and Summer seasons have been chosen by the joint color committee of the National Knitted Outerwear Association and the Wool Yarn Jobbers' Association, in cooperation with the Textile Color Card Association, it was announced recently by Margaret Hayden Rorke, managing director of the latter organization.

CHOICE OF A STRENGTH TEST FOR YARN

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than from the smaller packages like spools or bobbins because 120 yards has to be reeled off, from each of 4 ends to allow 4 skein breaks per warp. Similarly yarn must be split out for tests on a ball warp. Then unless something is tied in, some ends in the warp will be 120 yards short. Samples for the single thread test can be taken in this same way and tested as already described, but it may be only necessary to go into the warp far enough to avoid any irregularity at its end and then cut off a couple of yards for a sample. If eight skein breaks are a sufficient test thirty-two single strands would be an approximate equivalent. However, with the method under discussion, and with no extra trouble for sampling, a better average could be obtained very easily by making more breaks at two or three a minute up to whatever limit is allowed by the time that can be devoted to the test. An extra few minutes will allow double the number of breaks and come up to the standard of 8 per skein test.

In taking single thread tests from cones, bobbins or other yarn packages it is frequently customary to make a break, pull off an indeterminate few yards, make another break, pull off a few more yards, and so on until enough tests have been made. A saving in time can be made and a better sample obtained by reeling skeins from seven to ten packages at a time, cutting each skein across and drawing the required number of single thread tests from it. If the skeins are reeled carefully they can be weighed for count as already suggested, and then at least as much yarn tested as is usual in the skein test.

A rough rule for ordinary routine testing is that enough tests should be made so that the inclusion of one more value equal to either the highest or the lowest will not appreciably change the average. If in the case of uneven yarns the methods given do not meet this requirement more tests should be run.

If the yarn in the testing machine is clamped at the bottom by a round knurled head it is possible to carry it down around the head and fasten so that the pull comes around a smooth metal surface instead of directly where the yarn is clamped. This will usually reduce the number of breaks at the jaw or clamp.

Whether the single thread (loop) test when reduced to its lowest terms can be carried out from sampling through calculation in the same length of time as an equivalent skein test is not known. A comparison by one equally skilled in both methods would be necessary.

The time required for splitting warps can be entirely eliminated and a much more representative sample obtained. This would be worth while even if it necessitated some modification in the put-up to allow for sampling.

Minor economies of time will also be found. For example it is not necessary to tie up the ends of the test skeins if they are to be weighed for count and then cut for the single thread test.

Attention is called to Prof. George B. Haven's paper presented in April before the American Society for Testing Materials and reported in the May "Textile World" where he shows clearly the deficiencies of the skein test and advocates as a substitute the serigraph method which does not seem to the writer as useful for general all around work as the test that has just been outlined.

Summary

It may be stated again that the choice of a test must depend largely upon its purpose, the equipment available, and the form in which the yarn is to be sampled. The skein test has been definitely claimed to be better for some purposes, such as testing very uneven woolen yarn, in which case it is said also to grade yarns in the correct order of unevenness. In general, except for its convenience and familiarity, about the best that can be said is that the results of the test are usually proportional to yarn strength and will grade a series of samples in the correct order.

The single thread test is well adapted for use within an organization but, with some exceptions, it will not yet be so convenient for comparing with outside work. If desired, the same general scheme of sampling can be followed as would be used for the skein test, and more information obtained from the samples taken.

A greater appreciation of its value ought to bring it into more general use.

Shrinkage

Further research as a basis for standards for the shrinkage of woven cotton goods was decided upon by a meeting held recently under the auspices of the American Standards Association to consider a proposal for shrinkage standards submitted by the Shrinkage Textile Conference of the New York Board of Trade.

The meeting under the chairmanship of F. M. Farmer decided to limit its efforts for the present to piece goods as sold to the purchaser leaving the question of shrinkage of finished garments to future consideration. It was unanimously agreed to adopt as a basis for research and for the administration of standards, the method of test for shrinkage included in the Federal Specification for "Textiles; Test Methods." These methods are identical with the methods approved by the American Association of Textile Chemists and Colorists and the American Society for Testing Materials.

A committee will be appointed by the chairman to carry on further investigation and to report its recommendations at a later meeting.

Those present at the meeting were: P. G. Agnew, American Standards Association; W. D. Appel, U. S. Bureau of Standards; W. Ray Bell, Association of Cotton Textile Merchants; Charles L. Bernheimer, Textile Shrinkage Conference of the New York Board of Trade; F. A. Colt, Cotton Textile Institute; Howard D. Clayton, American Association of Textile Chemists and Colorists; Robert S. Dempsey, Association of Cotton Textile Merchants; E. J. Driscoll, Sayles Finishing Plants, Inc.; Ephraim Freedman, American Society for Testing Materials; M. Leo Gitelson, Textile Fabrics Association; R. E. Hess, American Society for Testing Materials; W. R. Howell, Bradford Dyeing Association; H. M. Lawrence, American Standards Association; Frank A. Lester, National Association of Finishers of Textile Fabrics; Albert Mannheimer, Standard Cloth Company; R. G. Myers, Sayles Finishing Plants, Inc.; Ruth O'Brien, American Home Economics Association; Ray Schlotterer, Textile Shrinkage Conference of the New York Board of Trade; H. G. Zervas, Lewiston Bleachery.

Standard Textile Chemical Company

Charles W. Carvin, well known throwster, has announced the filing of incorporate papers in the State of New York for the Standard Textile Chemical Company, a corporation formed to manufacture and sell chemicals in the textile field. At the outset, the Company will concentrate its efforts upon sizing and related materials. Mr. B. L. Hathorne has been developing new sizing products for the new firm for some time and has been retained by the Company to continue the development of sizing and other products for the textile industry. Mr. Hathorne is well known to the readers of this journal as the author of the series of articles on "Rayon Dyeing and Finishing" and the reports of the Rayon Sub-Committee of the A.A.T.C.C. of which he is chairman.

The new firm has located its plant in Conshohocken, Pa., its office at 450 Seventh Avenue, New York City, and its laboratories at 114 East 32nd Srteet, New York City.

Civil Service Examination

The United States Civil Service Commission announces the following-named open competitive examination: *Cotton Examiner (Foreign Staple)*. Applications for the position of cotton examiner (foreign staple), for duty in the Bureau of Customs at Boston, Mass., must be on file with the U. S. Civil Service Commission at Washington, D. C., not later than January 4, 1934.

The entrance salary is $3,200 a year, less a deduction of not to exceed 15 per cent as a measure of economy and a retirement deduction of 3½ per cent.

Competitors will not be required to report for a written examination, but will be rated on their education and experience.

Certain specified experience, or education and experience, are required.

Full information may be obtained from the Secretary of the United States Civil Service Board of Examiners at the post office or custom house in any city, or from the United States Civil Service Commission, Washington, D. C.

Regarding Patents

It has been called to our attention that the English patents mentioned in the article "Wetting Out Agents and Modern Mercerization Methods" published in our issue of October 23rd have corresponding American patents. They are as follows:

English Patent No.	*U.S. Patent No.*
E. P. 279,784 and 350,018	U.S.P. 1,776,052
E. P. 360,472	U.S.P. 1,851,393
E. P. 361,865	U.S.P. 1,851,394
E. P. 359,399	U.S.P. 1,851,914

CLASSIFIED

The rate for "Position Wanted" advertisements in this column is 2 cents a word—with a minimum of 50 cents per insertion. For all other types of advertisements—i.e., help wanted, machinery or supplies for sale—the rate is $5.00 per column inch or less per insertion.

DYESTUFF SALESMAN wanted by a large manufacturer. Man of about 35 years of age preferred, one who has dyestuff training and road experience. Good opportunity for the right man. State experience, salary, etc. Address Box No. 795, American Dyestuff Reporter, 440 Fourth Ave., New York, N. Y.

WANTED—A Laboratory man familiar with dyestuffs and their application, having at least five years' experience, for Salesman's position now open. State qualifications, salary expected. All matters treated confidentially. Address Box No. 796, American Dyestuff Reporter, 440 Fourth Ave., New York, N. Y.

A large dyestuff manufacturer is interested in securing a salesman and demonstrator, a man familiar with all branches of the cotton industry. Write Box No. 797, American Dyestuff Reporter, 440 Fourth Ave., New York, N. Y.

A COLD EMULSIFIER

- Emulsifies vegetable and mineral oils.
- Requires no soap or alkalis.
- Forms emulsions even in hard water.

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General Dyestuff Corporation

230 Fifth Avenue, New York, N. Y.

EMULSIFY with EMULPHOR A OIL SOLUBLE

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CHEMICALS

Carbic Color & Chemical Company, Inc.
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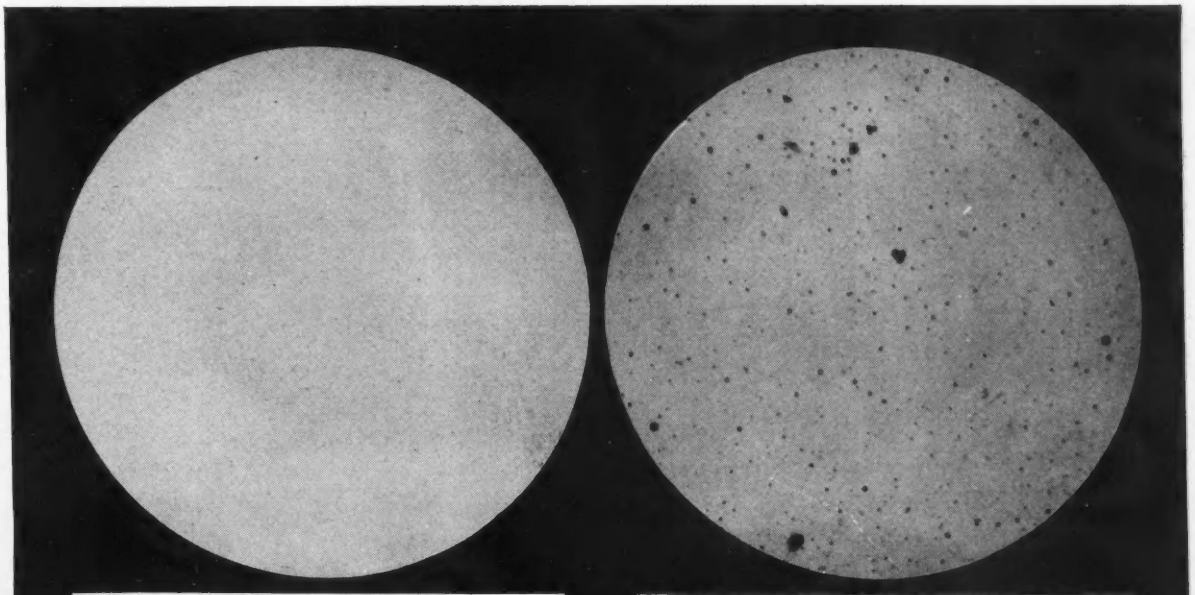
Branch Offices: Philadelphia, Providence, Boston, Greensboro, N. C., Hamilton, Ont.
SOLE AGENTS FOR DURAND & HUGUENIN S.A., BASLE, SWITZERLAND

●

We extend to you the season's greetings and express the hope that the New Year may bring you a full share of happiness and prosperity.

L. SONNEBORN SONS, INC.
NEW YORK CITY, N. Y.



SUPERTEX:—Unretouched photomicrograph, 70 diameters magnification, of Supertex. Note clean and clear surface free from insoluble particles.

ORDINARY GUM:—Unretouched photomicrograph, 70 diameters magnification, of ordinary gum. Note black spots—insoluble particles which retard dispersion of dyestuff.

Here's why Supertex excels!

● The microscope tells the story—*Supertex and ordinary printing gums are manufactured from the same raw materials—but notice the difference. Our patented special process makes Supertex a *thoroughbred* printing gum—so purified and clarified that it suspends dyestuffs and hydrosulphites in a much more finely divided state.

Many printers are fooled by printing gums because certain important characteristics are not visible to the naked eye. They are readily seen under the microscope, particularly after adding a small amount of tint to intensify the denser particles. Supertex is absolutely clear, showing no solid particles, while the ordinary gum contains numerous insoluble materials which, in printing, filter out on the surface of the cloth as illustrated above.

All the impurities of the raw materials which are impossible to convert have been removed from Supertex, resulting in an evenly suspended solution. This feature assures better dispersion of the dyestuff or hydrosulphite, better penetration, and better dyeing of the fibres. These two photographs prove that doctor streaks and scratches on rollers are impossible with Supertex.

Use Supertex for rich, true colors, clear and well defined printing, and complete penetration.

• • •

FREE—Write today for a free sample of Supertex for your own testing with any ordinary printing gum.

*TRADE NAME REGISTERED AND PROCESS PATENTED

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Manufacturing Chemists and Importers

Passaic, N. J.

Warehouses: Providence, R. I. • Philadelphia, Pa. • Utica, N. Y. • Chicago, Ill. • Greenville, S. C. • Chattanooga, Tenn.

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Also: GLAUBER'S SALT - NITRE CAKE - SODIUM SULPHIDE - SODIUM SILICATE - TIN TETRACHLORIDE - TIN CRYSTALS - POTASH ALUM - SULPHURIC, MURIATIC & NITRIC ACID - and other Heavy Chemicals of Standard Purity.

"Service" as General Chemical Company conceives it, starts with prompt and intelligent attention to your initial inquiry and carries through until the final shipment of your year's delivery schedule is safely in your hands. The Company's nation-wide organization is one in upholding this standard. Address your inquiry to the nearest office.

GENERAL CHEMICAL COMPANY

40 Rector Street, New York

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Sales Offices:

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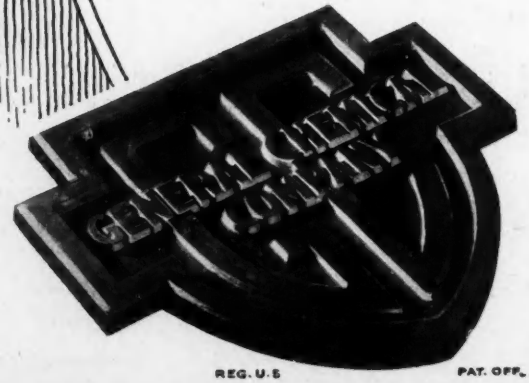
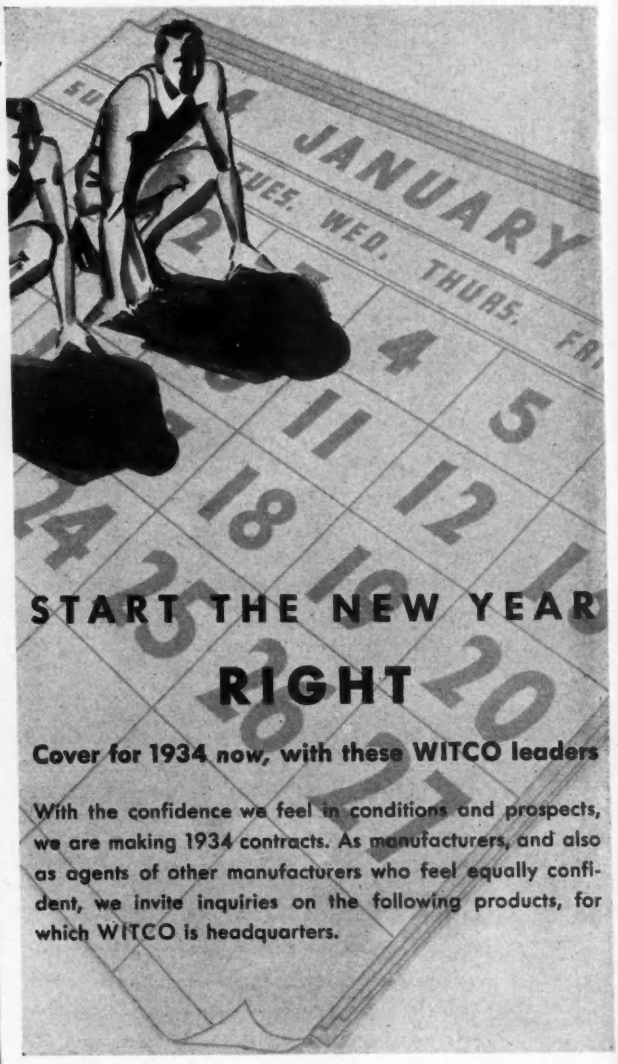
In Canada: The Nichols Chemical Company, Ltd., Montreal, P. Q.





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Cover for 1934 now, with these WITCO leaders

With the confidence we feel in conditions and prospects, we are making 1934 contracts. As manufacturers, and also as agents of other manufacturers who feel equally confident, we invite inquiries on the following products, for which WITCO is headquarters.

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Blanc Fixe
Whiting
Stearic Acid
Stearates
Chromium Green Oxide
M. R. (hard hydrocarbon)
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REG. U. S. PAT. OFF.

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Gardinol actually saves you money by increasing the speed of rinsing. At the same time it improves the uniformity with which materials can be rinsed. Gardinol is a powerful emulsifier and cleanser. It is used in wool scouring and dyeing and in cotton, silk and rayon preparation dyeing. Besides speedy rinsing, it has these additional features:

1. Is not precipitated by hard water.
2. Acts as retarding agent with exceptional levelling action in dye baths.
3. Its highly valuable properties are sustained in both acid and alkaline baths. It is neutral in solution.
4. When it is applied to fibres it does not deteriorate on storage. Under ordinary atmospheric conditions, it remains stable.

THE IMPROVED TYPE OF GARDINOL IS NOW SUPPLIED IN FLAKE FORM

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(Patents applied for)

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JOE: Bill, what makes you so sold on Exsize? A fellow was in yesterday with something he said was just as good, for much less.

BILL: You know, Joe, there's only one Exsize. And that "something" *wasn't* "just as good."

JOE: You ought to know. What's the answer?

BILL: Lots of reasons. But I know your weak spot nowadays is costs. And Exsize costs less to use, because you use less.

JOE: Never realized it, but you seemed to have the dope.

BILL: It's a fact. And it's always uniform. Never varies from day to day.

JOE: How is it when we're rushed?

BILL: Say, you hit a point I've proven for myself. I *know* Exsize works faster than any other desizing extract I've ever used. And I know 'em all. Moreover we can get quick shipment of Exsize in an emergency.

JOE: Fine. So you want to stick to Exsize?

BILL: I do, but you're the boss, Joe.

JOE: No reason why we should change. Our stuff is coming through better than ever.

BILL: Okay by me.

6 *points about* EXSIZE

1. Costs less to use, because you use less.
2. Always uniform.
3. Highest diastatic content.
4. Works faster.
5. Prevents waste in barrels.
6. Assures perfect dyeing and finishing.

If you have a particular problem in your mill, write us. Our laboratories and representatives are always at your service. P. Ballantine & Sons, Newark, New Jersey.

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DYESTUFF REPORTER

DEVOTED TO THE INTERESTS OF TEXTILE CHEMISTRY
• BLEACHING • DYEING • FINISHING • PRINTING •
AND THE NECESSARY MECHANICAL EQUIPMENT

"Circulated Everywhere Textiles Are Processed"

VOLUME XXII | DECEMBER 18, 1933 | NUMBER 26

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Official Publication of the American Association of Textile Chemists and Colorists

THE OBJECTS OF THIS ASSOCIATION ARE:

"To promote increase of knowledge of the application of dyes and chemicals in the Textile Industry.

"To encourage in any practicable ways research work on chemical processes and materials of importance to the Textile Industry.

"To establish for the members channels by which the interchange of professional knowledge among them may be increased."

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The complexity of rayon sizing gums has presented special difficulties to finishers, in the desizing of rayons or rayon mixtures. Proper finishing demands complete removal of the size.

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will completely remove all types of rayon sizing gums without any possibility of injury to sheerest fabrics or most delicate colors and no special equipment or complicated processing is required. Rayons desized with DEGOMMA 20F permit new standards of excellence in dyeing, printing and finishing.

Degomma 20F is a dry, white powder which is convenient and accurate to use. It sets a uniform standard of high effectiveness as a result of careful manufacturing control. It does not lose its strength in storage.

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BECCO Concentrated HYDROGEN PEROXIDE

Up-to-date mills all over the United States have discovered these two **modern** essentials to a superior and economical bleach. **Becco** Concentrated Hydrogen Peroxide **plus Becco** Technical Service means a careful, accurate application of peroxide to **your** bleaching requirements. The result, to which so many mills bear testimony: the highest quality bleached goods at lowest unit cost. **Becco** can be adapted to the bleaching of any fabric—raw stock, yarns, knit goods, hosiery, piece goods, specimens, etc. Write for full details.

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Customs change, but the Christmas spirit is ageless. Today millions express it by the purchase of Christmas Seals—the penny stickers that fight tuberculosis—still the greatest public health problem. Your pennies will help pay for free clinics, nursing service, preventoria, tuberculin testing, X-rays, rehabilitation and other important work such as medical and social research.

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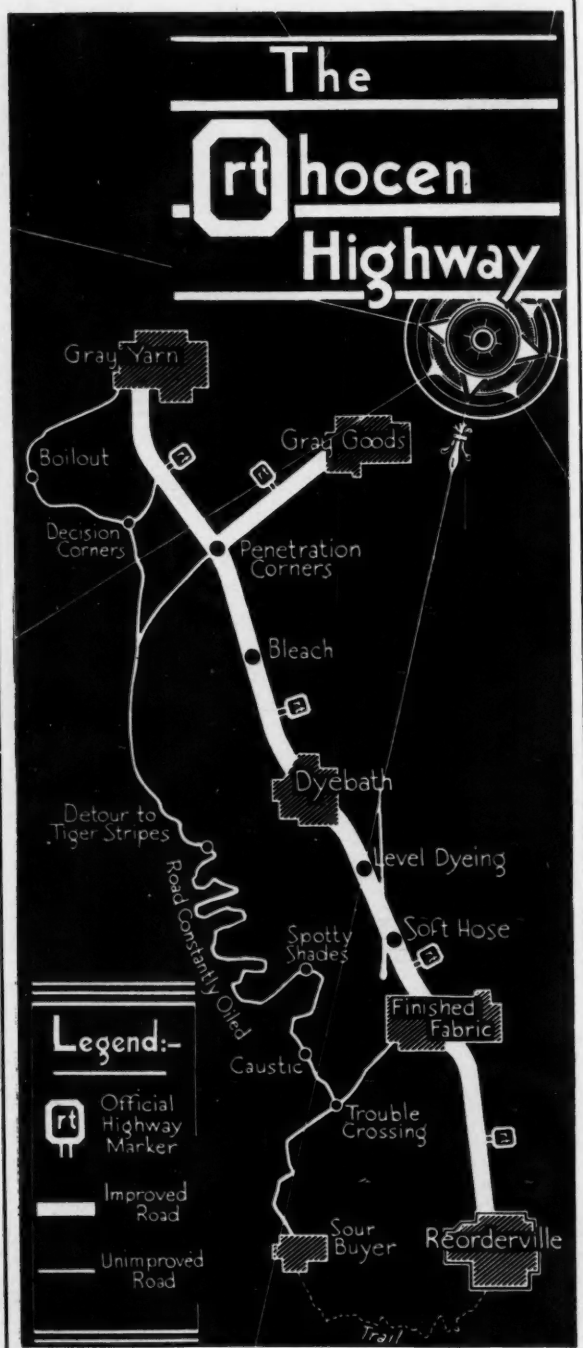
Quality knows no detour



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Canadian Representative
Canadian Aniline & Extract Co., Ltd.
HAMILTON, ONTARIO

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